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(Alm.) 1845 e. 16/1808

EVENING AMUSEMENTS;

OR, THE

BEAUTY OF THE HEAVENS *DISPLAYED*.

IN WHICH

SEVERAL STRIKING APPEARANCES,

TO BE OBSERVED ON VARIOUS EVENINGS IN THE

HEAVENS,

DURING THE YEAR

1808,

ARE DESCRIBED;

And several Means are pointed out, by which the Time of
Young Persons may be innocently, agreeably, and
profitably employed within Doors.

INTENDED TO BE CONTINUED ANNUALLY.

BY WILLIAM FREND, ESQ. M. A.

FELLOW OF JESUS COLLEGE, CAMBRIDGE; AND ACTUARY
TO THE ROCK LIFE ASSURANCE OFFICE.

Os homini sublime dedit, cœlumque tueri
Jussit, et erectos ad sidera tollere vultus.

LONDON:
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[Price 3s. boards.]

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ADVERTISEMENT.

FOR this year's volume the Author had selected the motions of the planets, to be so represented by means of pasteboard and thread and beads, as to give to every reader an easy mean of figuring them to himself, and by degrees to understand their minute movements. The appearance of the Comet broke, in some degree, into his plan, and naturally made him attentive to the motions of those very extraordinary bodies in our system. It will be many years before they are thoroughly understood, but we know sufficiently of them not to be alarmed at their appearance; and the author expects, by next year, to shew what little reason there is to apprehend any danger from them. He has given this problem to some ladies to solve, namely, to calculate, first, what is the chance of a comet injuring the earth, by coming within fifty diameters of it; supposing a thousand comets to move in the plane of the earth's orbit, each comet's revolution being two hundred years. From this, we may be led to the more enlarged view of the problem; and suppose ten thousand to move in the same number of years, each round the sun, and at intermediate inclinations to the plane of the earth's orbit. The very elegant schemes, shewn to the author by some ladies, within the last year, induce him to hope, that they will improve upon his plans, for planetary and cometary motions; and that the pasteboard, with the thread and beads, will be well understood in the best seminaries of education.

EVENING AMUSEMENTS;

OR, THE

BEAUTY OF THE HEAVENS DISPLAYED.

TO THE READER.

IN the beginning of my undertaking, I recommended to my readers to keep each volume, as it came out, and not to throw any aside; though the appearances of the heavens for that year might be considered to have been past, and no longer to be worthy of our attention. But the end of this work will be much mistaken by those who thus neglect my volumes: for, in the first place, each depends upon the other, and reference will be continually made from one to the other, before the whole subject, as appearances in the heavens bring it forward, is completed. In the second place, the motions of the heavenly bodies are not bounded by a year, or by many years; and even that, which makes its revolution around us in the shortest time, requires many years before, by observation, such a motion can be well understood.

I have also continually urged the necessity of looking back to the former volumes, either to refresh the memory on those little points, which are apt to escape it, and yet are essential to future knowledge; or to give that knowledge, which, having been neglected at first, is still to be learned, before any volume can be understood. Thus the making of a circle with a pen, as well as with a pair of compasses, is a little trifling thing in appearance; yet many of my readers at present cannot do it, and some would even now be troubled, when they have made a circle in this manner, to mark out upon it the thirty-two points of the compass. It is never too late to learn. To have clear ideas upon any subject, we must take the necessary pains; and the labour cannot be called great, which may be overcome in a few minutes; and the operations are only amusements for a few winters' evenings. If you have not yet made a circle with a pen, in the manner described in the volume for 1804, page 17, and marked upon it the points of the compass, as described in pages 18, 29, 39, of the same volume, I recommend to you to amuse yourself immediately with the attempt, which will every evening be better made, till your circle is well formed, and you have a true notion of the compass, on which so much in astronomy and navigation depends.

I have known many persons speak highly of astronomy, delighted with the views it presents of nature, expatiating on the wonders of the heavenly motions, yet they will not give themselves the trouble of forming a clear idea of any part of the subject; and in fact, what they utter is merely the conceptions of writers who dilate on their favourite subject. Such persons may also have a notion of the progressive or retrograde motion of a planet upon paper, yet it is merely paper knowledge, and they cannot transfer their ideas acquired by the paper to the real motion in the heavens. The path of Jupiter, as delineated in last year's volume in the third plate, and representing his apparent motion for a whole year, under the two stars of the Goat, such as it actually struck the eyes of many observers in the summer and autumn, is a very different thing from the circle they have been taught to contemplate. But it is the figure on the plate which shews the nature of the motion: and this being understood, as it could not but be understood by those, who observed it for many nights together under the two stars, will completely explain, what is so imperfectly taught in most systems of astronomy. The plate pointed out the upper star, or first of the Goat, as being a double star: yet this fact will have escaped thousands of persons who have looked on these two stars; though, the moment it is pointed out, it is at once discerned by all, whose sight is not defective.

One of the great difficulties in teaching any art or science, is to bring the mind out of its naturally passive state, and to endue it with necessary activity. This great distinction in mankind is very much overlooked; and teachers too frequently are contented with teaching by rote, instead of calling out the latent powers of the mind, and enabling it to understand its own operations. Thus the use of the globes may be so taught, that the learner may perform every thing that is desired of him, yet have no idea of what the whole was intended to convey. A learner, in the same manner, may do sums in arithmetic that have been given to him; yet he will be entirely at a loss, if any thing out of the common way is proposed. In both cases the fact is, that the learner has never been taught to think; he is some degrees only beyond a parrot.

The first distinctions made by nature in the powers of the mind, are not so great as is generally imagined: and of two persons of originally equal powers, the one may, merely from the circumstances in which he is placed, remain in a passive state, while the other is daily improving in intellect. It is worth your while to consider, whether you are in the active or the passive state, and how far it is desirable, if you are in the latter, to endeavour to raise yourself into the higher class. For those in the passive state, there is no want of food for their nourishment. Plays and concerts, and novels, and romances, and routs, fill up the vacuity of the mind, as well as such contrivances can do it: but unfortunately the mind grows weary of these things, and is in danger of sinking, when the palled appetite has no other resources. On the other hand, the mind of activity has always something new to employ it; as it advances in the fields of science, new prospects are opened, new difficulties are over-in any book of travels which engages public attention.

I am accustomed to think what are called trifling things to us of so much importance, that I could wish that even the newspapers were made the means of diffusing knowledge. The events of the years we live in are not contemptible; and we might rise from them to the history of the past, better, perhaps, than by beginning with remote interest, and coming down to the present times. Thus every day would bring an occurrence which might send the boys of a school to their globes and their maps. The younger boys might find the place on the globe, the larger boys give a description of it, and some little account of its present and its past state. It is astonishing what would be done in two or three years by perseverance in this simple plan. The boys would be amused by it, the daily accumulation of knowledge would be gratifying, and in future life the advantage would be sensibly felt.

As I have noticed the necessity of preserving my books, there is one on which I must lay a peculiar stress, and that is the volume for 1806. In this volume are given the positions of the stars;

so that in every year they may be referred to; and in the present volume, at the end of every month, references are made to it. I have been repeatedly asked for such a thing; and some persons, who in the last year, for the first time, took up my work, not being sufficiently attentive to the references made at the end of each month in that volume, wondered that I had not done it. Now to give the positions every year would make the work very expensive, a circumstance which I have been very solicitous to avoid; and if any of my readers are less careful of the other volumes, I would have them to recollect, that the volume for 1806 should be continually in their hands; that if at any night they are at a loss about a particular star, it is merely by consulting the table at the end of the month, and they will be sure to find out, in the description of the position, referred to at the hour they saw the star, its name and position.

JANUARY, 1808.

IN the plates in last year's volume, pages 94 and 136, were given the paths of the planets, Saturn and Jupiter, as they appeared to an observer, who noticed their places on the evenings or mornings when they were visible. Saturn we perceive went through a much smaller space in the heavens than Jupiter; for the plate of Jupiter's path, page 94, contains twenty-seven degrees, whilst that of Saturn, page 136, contains only twenty degrees. The course of each was first forward, or from west to east; then backward, or from east to west; and lastly forward, or from west to east again. The first motion, or from west to east, is called a direct motion; the next motion, or that from east to west, is called a retrograde motion, and we may fix the meaning of the term retrograde, by recollecting that, when an army runs away, it is always said in the gazette of the country to make a retrograde motion. Retrograde means a step backwards; retro being Latin for backwards, and gradus, which we have changed into grade, is Latin for step. Thus the planets make a retrograde motion when they move or step backwards: and, as we call the motion in the heavens from west to east the direct motion, the contrary, the motion from east to west, must be a retrograde motion.

The point, at which the planet takes its turn from one to the other, is called the stationary point. For it is the same with them as with us; if we are walking slowly backwards and forwards, we must stop for an instant, when we make our turn, and, as the motion of the planets is very slow, they will appear, when they make their stops, to be for some time nearly in the same place. Saturn will be longer in turning than Jupiter; Jupiter than Mars; Mars than Venus. The planets are not at any time at rest, though they appear to be so to us: Herschell is stationary in July; and for a week together, it will be very difficult for the astronomer, whose name and fame will accompany this planet to the remotest posterity, to discern with his unrivalled glasses any change in his situation.

The path of Herschell, given in the first plate, is similar to those of Saturn and Jupiter, described last year; he is first progressive, then regressive, lastly progressive. Or his motion is first direct, then retrograde, lastly direct. Of course he has two stationary points. His whole path for the year is contained within eight degrees: and his progressive path at first differs so little from his regressive, till he is returned to nearly the same point, that it is difficult to mark it clearly on paper, and in fact it cannot be done strictly in a small plate. It is by no means difficult to understand, why these planets should so differ in their motions, that some shall appear to go through every sign in the course of the year, whilst others are confined to very small limits; and in fact a planet might be removed to such a distance, and for aught I know there may be such planets, that in the space of a year they shall scarcely be discovered to have moved; and it may require some thousand generations of man to ascertain a single revolution.

I must remark here, that in looking at the plate of Herschell's path, the stars represented on it appear in similar situations with respect to him as they do in the heavens. If we hold up the plate between us and Herschell, so that the line, drawn from our eye to his place in his path and to his real place in the heavens, the figures 1 2 being on our right hand, then we should discern the stars to the right or left of him as the plate points them out. In this plate the west is to the right hand, and the east to the left, as may be observed from the course of the degrees on the line, which represents the ecliptick or earth's path: but this circumstance was overlooked by a very able astronomer last year, in looking at the plates of the paths of Jupiter and Saturn, and he conceived, that they were wrongly delineated, because he had been accustomed to mark them down in a different manner, with the east and west points being on the same hands as on maps of the earth. But it has already been observed, that in looking at the heavens, we look at a concave round: in looking on the earth we look on a convex round: and hence the maps, which represent portions of each, are formed in a different manner. For the concave round the west is on the right, and the east on the left hand: for the convex round the east is on the right, the west on the left hand.

We may observe by the plate of the path of Herschell, that he moves very little way in his upright from the ecliptick. In fact, his whole change is only three minutes; his greatest distance from the earth's path being thirty minutes, and his least distance twenty-seven minutes. Many persons will be able to see him with the naked eye, and the circumstance of his passing so very near to the small star, the eleventh of the Virgin, will point him out clearly to every observer, who uses a glass of a small power. He passes too near to it, for the plate to mark accurately the interval between them; and for several nights together he will be seen very near to the star, both in his direct and his retrograde motion. The circumstances of a variable motion in the upright from the ecliptick, and also so small a motion during the year, may naturally excite curiosity: but I leave you to consider and explain them, observing only, that you will not hesitate to affirm, that the cause cannot be in the planet only; it must arise from the motions of the earth and the planet in their orbits, and by means of your earth and planet beads, you will be led to an easy solution of these appearances. We will now consider the changes that take place in the heavens during this month.

On the 1st, the Moon is at its first appearance between the second and the eighth of the Water-bearer, but nearest to the eighth. Above her are the first of this constellation, and the four small stars in the Water-pot; but she is nearest to the first, and high in heaven above her are the four bright stars in square, the three first of Pegasus and the first of Andromeda, the latter star being the highest. Below her are Jupiter and Mars, the latter setting about six o'clock. On the 2d, she is seen very near to the four small stars in the Water-pot, being at six o'clock about three degrees from the nearest of them, the small star under, and about a degree from her, is the tenth of the Water-bearer. On the 3d, she is within two degrees of the third of the Fishes, a small star above her, and at her first appearance is observed to have passed the line drawn through the second and first of Pegasus, the two eastern of the four stars in square, the first being the nearest to her.

On the 4th, the Moon is on the meridian at fifty-eight minutes past four, being then very near the line drawn through the first of Andromeda and the third of Pegasus, the two eastern of the four stars in square, the third of Pegasus being the nearest to her. This line she passes a little before midnight. On the 5th she is on the meridian at forty minutes past five, having to the west of her the four stars in square, and to the east of her the three first stars of the Ram, the latter stars being farther from the meridian, than the two eastern of the four stars in square. Above the Moon, and near to the meridian, is the second of Andromeda. On the 6th she is on the meridian at twenty-two minutes past six, the three first stars of the Ram being above her to the east of the meridian, and below her to the east, and at a considerable distance from the meridian, is the first of the Whale. During this night, if fine, we shall have an opportunity of shewing to any person with ease the three first stars of the Ram, as they are so near to and above her during the night.

On the 7th the Moon is on the meridian at six minutes past seven, but now nearly in a line with the first of the Ram and the first of the Whale, but much nearest to the former star. The first of the Ram is above her to the west, and the first of the Whale below her to the east of the meridian. Considerably above her are, to the west of the meridian, the third of Andromeda, and to the east of the meridian Algol, or the second of Perseus, noted for its changes of light. During this night, if fine, we cannot fail of clearly directing her course to the thirteenth of the Twins, which she will pass to-morrow morning at eighteen minutes past seven. Below the thirteenth we shall distinguish the third of the Twins, and if her splendour and the Moon were not too great, we might observe near to her the seventh and the twelfth, which are above the thirteenth; directly above her is the second of the Waggoner, and of course to the west of it Capella, both at too great a height to be noticed without some little trouble. Above the Moon, to the west of the meridian, is the second of the Bull; and, as she is a long time above the horizon, the objects around her may, if the night is fine, be pointed out with great ease; Orion will peculiarly claim attention; the Great Dog, the Lesser Dog, the Twins, Capella and his companion, with the Bull, will each be easily discovered.

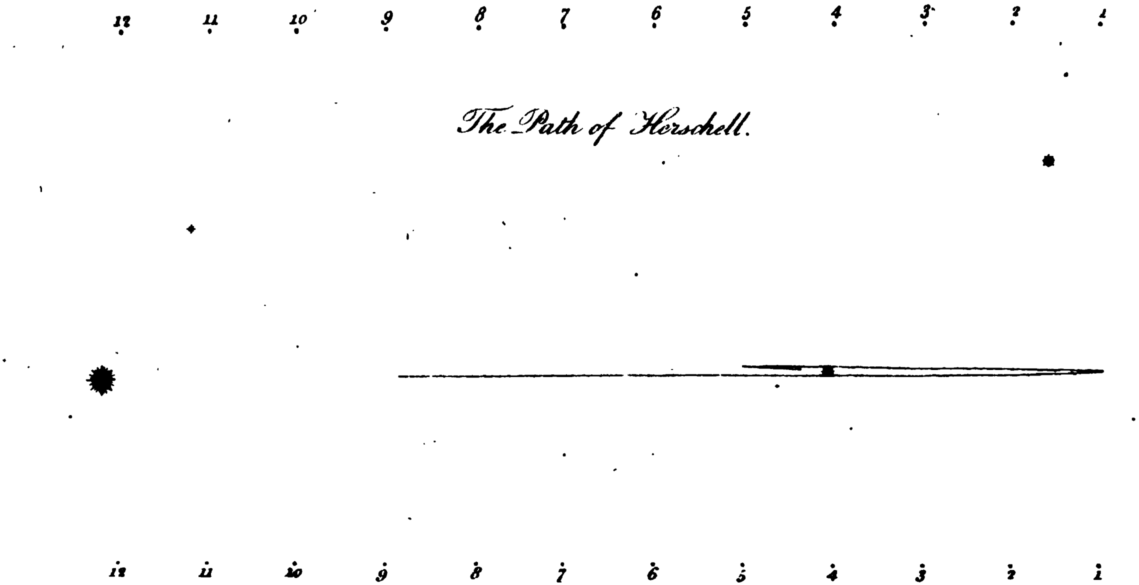
On the 12th the Moon is on the meridian at twenty-two minutes past eleven, being considerably past the line between the third and the second of the Twins, as she passed it between six and seven in the evening. For some time, therefore, during the evening, the first of Orion, the third of the Twins, the Moon, and the second of the Twins will be very nearly in the same straight line;

and when the Moon is on the meridian the constellation of the Great Dog will be seen directly under her, Sirius being to the west, and the fourth of this constellation to the east, but very near to the meridian. Above the Moon the two first stars of the Twins will naturally claim our attention, but her brilliancy will overpower the small stars in the Crab, to the first of which constellation she is directing her course.

On the 13th the Moon is full at thirty-one minutes past three in the afternoon, when she is nearly four degrees to the south of the ecliptick, or Sun's path, and of course there cannot be an eclipse of the Sun. During the night we may observe that she has passed the line between the second of the Twins, and the first of the Lesser Dog, and is approaching the line drawn from the first through the second of the Twins, which passes through the small stars in the head of the Hydra, and this line she passes before day-break. As her passage is in the barren part between the Twins and the Crab; no object is near her to claim attention; but, besides the objects we have noticed we may look to the east of her for the principal stars in the Lion, which will not be overpowered by her brilliancy.

On the 14th two occultations take place, as the Moon passes between us and the two stars, known by the name of the first of the Crab; the first of these stars she passes over near nine o'clock; the immersion, or point of time, when the eastern rim of the Moon touches the star, taking place at forty seconds before nine, and emersion, or point of time, when the western rim of the moon leaves the star, taking place at forty-nine minutes and three quarters past nine. At the immersion the star is ten minutes and three quarters south of the Moon's centre, and at the emersion the star is ten minutes south of the Moon's centre. At fourteen minutes past ten, the occultation of the other star, or the second first of the Crab, begins: this star being on its immersion fourteen minutes north of the Moon's centre; and at forty-two minutes and three quarters past four, the star emerges, or the Moon's western rim quits it, when it is fifteen minutes north of her centre. If these occultations had taken place when the Moon was young, they would have afforded a very pleasing sight; but her brilliancy is too great for the immersions or emersions to be detected. At this time she is above the line between the first of the lesser Dog and the first of the Lion, but nearest to the first of the Lion.

PLATE I.



The Path of Herschell.

J. Bye sculp.

On the 15th she precedes at her rising the first of the Lion; and will be seen during the night, under the head of this constellation, directing her course to the sixteenth, a small star under Regulus, or the first of the Lion, and at two in the morning she passes the line drawn from the third through the first of the Lion, which produced, passes nearly through the first of the Hydra. At nine o'clock she is thirty-five degrees eight minutes from the second of the Twins. On the 16th she rises under the body of the Lion, being near the line between the first of the Hydra and the second of the Lion, the first of the Lion being much nearer to her than the second of this constellation; she is directing her course to the first of the Virgin, and at nine o'clock is forty-eight degrees fifty-one minutes from the second of the Twins. On the 17th at her rising she is nearly out of the constellation of the Lion, and we shall observe above her, a little to the south, the first of the Lion, at a much greater distance from her than the second of the Lion above her to the north. As she rises in the heavens we may notice that her course goes under the five stars in triangle of the Virgin; as, at midnight she is about five degrees from the second of the Virgin, the most western of the five stars in triangle, and in a line between that star and the stars in the Cup. At nine o'clock she is twenty-five degrees forty-eight minutes from the first of the Lion.

On the 18th the moon rises under the five stars in triangle of the Virgin, being at midnight in the line between the third of the Virgin, or the star at the angular point of the five stars, and the seventh of the Crow. They who would note her course on the preceding evening will evidently see that she must soon pass near to the first of the Virgin. At midnight she is forty-one degrees thirty-seven minutes from the first of the Lion; and during the morning of the 19th we may notice her approaches to the first of the Virgin; and, on the morning of the 20th we may perceive that she rises under the first of the Virgin, having passed near to that star at sixteen minutes past nine of the preceding evening; and, during the morning her recess from that star will be apparent. On the 21st she rises in the morning preceding the first of the Balance, and will be seen to approach nearer to that star till day-light. As she rises in the heavens Saturn will be seen to the east of her, and her position under the two stars of the Balance, having the first of the Virgin to the east, and Saturn and Antares to the west of her, is interesting.

On the 22d she rises under Saturn, and is directing her course to the second of the Scorpion, to which star she will pass very near in the afternoon; and as this star is to the north of the ecliptick, and at her rising the moon is south of the ecliptick, it is evident that she passes the ecliptick some time this day; but though she is in the situation favourable for an eclipse, it is clear that there cannot be one, as she is not half way in her last quarter. As she rises high in the heavens, Saturn to the west, and Antares to the east of her, will claim attention, and the scene will be more interesting when Venus rises, who is to the east of Antares. On the 23d the Moon rises a little before Antares, and is seen as she mounts the heavens nearly at an equal distance from this star and the second of the Scorpion. Saturn is now at a considerable distance from her to the west, but by her course it seems that she must pass very near to Venus. On the 24th she rises under Venus, having passed very near to that planet at midnight of the 23d, and her recess from Venus will, during the morning, form an interesting scene. On the 25th she will be seen to have receded considerably from Venus, but during the morning the line between her and the first of the Virgin will be interesting, as near to it are the two planets Saturn and Venus and a star of the first magnitude, besides the two stars of the Balance and the small stars in the Scorpion; but as she is now entering into a barren region, and is so near to the Sun, we will defer our observations till after she has renewed her light and is again visible to us in the evening.

On the 27th, at nine minutes past four, is new Moon; but there cannot on this day be an eclipse of the Sun, as she is upwards of four degrees and a half from the eclipticк. On the 29th we may perceive her in the evening under the small stars in the Water-pot, the four stars in square being directly above her and them. On the 30th the stars in the Water-pot will be seen to the west of her, and above her the four stars in square, as she has passed the line drawn through the second and the first of Pegasus, the two western of these four stars, the second being the highest. On the 31st she is still seen under the four stars in square, not passing the line between the first of Andromeda, and the third of Pegasus, the two eastern of these four stars, but she will evidently do this before we see her again. At six o'clock she is thirty-seven degrees fifty-three minutes from the first of the Ram.

Mercury is a morning star during the whole of this month, and early risers will see him in the south-east about an hour before sun-rise in the beginning of the month, but after the first week the Sun will overpower him, and he will be seen only by keen observers. His progress is from the eighth of the Serpent, bearing through the sign of the Archer, and ending under the two first stars of the Goat, a course of about thirty-eight degrees. He passes the ecliptick on the 9th, but, being then sixteen degrees from the Sun, he cannot afford any particular object of observation. At such a time the reader remembers that a transit may be expected, an occurrence, as will be seen in the sequel, which does not often take place.

Venus is a morning star, and will present herself in a very brilliant manner, so much so, as to be seen, most probably, after Sun-rise; for at Sun-rise on the first she will be within ten degrees of the meridian; she is then just to the east of the four stars in square of the Balance, being between the third of this constellation and the seventh, and from this latter star she is only fifty minutes distant on the 2d, the star being to the north of her. On the 4th she passes the eighth of the Balance, the star being only eighteen minutes and a half to the north of her; her course under the third, seventh, and eighth, will sufficiently point out these stars; and under her the second and first of the Scorpion will claim attention. On the 8th she passes the second of the Scorpion, but at some distance. The varying forms of the triangle made each morning by the second and first of the Scorpion and Venus will be striking. On the 23d the Moon passes near to her at noon, and in the morning of this day she is only thirty-three minutes from the seventeenth of the Serpent bearer, this star being to the south of her: of course we look farther under her for the eighth of this constellation, to the east of which is the nebulous star: she is directing her course to the twelfth of the Archer, and ends it within five degrees of the two stars under this name, near to which it is evident that she will pass early in the next month. Thus she passes through about twenty-five degrees in the course of the month, and this distance will be the more observable, by comparing her situation with respect to Saturn: in the beginning and end of the month, they were little more than four degrees distant from each other, and at the end are separated by so long an interval.

Mars is an evening star, and at its first appearance is seen soon after Sun-set in the south-west to the east of the line passing through the two first stars of the Goat, and about six degrees from the lowest of these stars. Jupiter is higher up to the east of and about ten degrees from him; his course is bent towards Jupiter; and by observing it a few evenings, we shall naturally expect a near approach; for, as he recedes from the two stars of the Goat, his distance from Jupiter is constantly diminishing. On the 18th his distance is the least, as on this day Mars passes Jupiter at the distance of only eighteen minutes and a half; but to observe them we should take the first opportunity after Sun-set, as they follow the sun very closely. On this day the two planets are near to the four small stars in the tail of the Goat; Mars being between Jupiter and the two brighter of these four small stars, or the third and fourth of the Goat. From this time the distance between Mars and Jupiter daily increases; at the end of the month, amounts to nearly eight degrees; Mars traversing this month a space of nearly twenty-four degrees and a half. The fiery red of Mars would distinguish him from Jupiter, if the difference of size did not easily point him out. The Moon passes him on the 29th.

Jupiter is an evening star, considerably to the east of the two first stars of the Goat, and moving slowly by the two next stars in this constellation or the stars in its tail. On the 1st these two stars are to the east of him, at the distance of about six degrees, and at the end of the month they are under him, at about a degree and a half from him. The Moon passes him on the 23th.

Saturn is a morning star, being on the 1st of the month in the oblong of the Balance, nearly in a line between the third and the thirteenth of this constellation, and his progress is very slow, being at the end of the month little more than two degrees farther eastward, and near to the sixth of this constellation. Every morning, therefore, we shall see him rising under the two first stars of the Balance, and forming with them and the two first stars of the Scorpion a very pleasing object. The Moon passes him on the 22d.

Herschell is a morning star, and in very good place for observation, being very near to the star in the foot of the Virgin, or the eleventh of this constellation. This star, it will be recollected, is easily known by drawing a line from the first of the Virgin to the first of the Balance; and near, but above the middle point of this line, and nearest to the first of the Balance, is the eleventh of the Virgin. By directing a telescope to this star we cannot fail of discovering Herschell, as he is very near his stationary point.

The apparent diameter of the Sun decreases, being on the 1st thirty-two minutes thirty-five seconds and a half, and on the 25th thirty-two minutes thirty-two seconds and a half in magnitude. The apparent diameter of the Moon first decreases, then increases, and finally decreases. On the 1st, it is thirty minutes twenty-two seconds, and decreases till the fifth, when it is twenty-nine minutes thirty-eight seconds, from this time it increases to the 17th, when it is thirty-two minutes and a half, being of the same magnitude from midnight of the 16th to noon of the 18th, when it decreases to the end of the month, finishing with a magnitude of twenty-nine minutes forty-two seconds.

The appearances of the fixed stars in the heavens will be known by referring from the following table to the descriptions given of them in the volume for the year 1806.

Pos.	1		8		16		24	
	h.	m.	h.	m.	h.	m.	h.	m.
X	4	43	4	12	3	38		
XI	6	41	6	13	5	39	5	5
XII	8	50	8	19	7	45	7	11
I	10	40	10	9	9	35	9	1
II	0	43	0	12	11	38	11	4
III	2	32	2	1	1	27	0	53
IV	4	53	4	22	3	48	3	14
V	6	44	6	13	5	39	5	5
VI			8	9	7	35	7	1

By means of this table any object, which strikes a person in the evening or night, will, if unknown, be easily discovered. For example, if between eight and nine o'clock of the 1st of this month a person perceives a very bright star in the lower part of the lower region, near the south-east, he looks to this table and finds that at fifty minutes past eight, the twelfth position is described, and of course that position will tell him the name of the star he was noticing. He therefore turns to his volume for 1806, and at page 263 he finds the twelfth position described, and in the description of the stars of the first magnitude he reads that Sirius is in the lower part of the lower region, near the south east; he cannot then doubt that Sirius attracted his notice in the evening; and so for any night he looks to the top of the table for the day of the month, under it he finds the hours on which any position appears, and in the left hand column is the index of the position. Thus, on the 16th, between five and six in the evening the eleventh position is to be consulted. On the 24th at nine in the evening the first position is to be consulted, and these positions are to be found described in the volume for 1806, the first beginning at page 168.

FEBRUARY, 1808.

I LEFT you last month to explain, by means of your planet and earth beads, the motions of the planet Herschell; and, as last year you had attended chiefly to the inferior planets, you have discovered an essential difference between them and Herschell. In the course of the year they appear to make more than a complete round of the heavens, as you will see by placing the planet bead and the earth bead in the same line with the Sun or centre of the pasteboard.* Let the planet bead, being between the earth bead and the Sun, be moved faster than the earth, and it will evidently come to the place whence it first set off, sooner than the earth bead is brought to the place whence it first set off; that is, as the earth goes round the heavens in a year, an inferior planet makes its round in less than a year.

Now as Herschell, so far from going round the heavens in a year, moves only through eight degrees this year, it is obvious, that, instead of being between the earth and the Sun, we are between him and the Sun. Let us now attempt to explain the motions of a planet, which is farther from the Sun than we are. In this case we draw a thread through the middle of a piece of pasteboard, and fix a bead at the end of it, so that it may make as large a circle round the centre, as the piece will admit. We then draw another thread in the same manner through the centre, and fix a bead at the end of it, the thread being shorter, so that this bead may describe a circle within the other. The bead having the shorter thread we call the earth bead, the other we call the planet bead. Now let the two beads be fixed in the same straight line with the Sun or centre, and whilst the planet bead moves one degree, let the earth bead move two degrees. It is evident that the earth bead comes to the place whence it first set out sooner than the planet bead; and of course, that a superior planet does not make a round in the heavens in the course of a year.

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* See the volume for 1807, page 98.

If the earth bead is placed very near to the planet bead, and the earth bead should move sixty-five-minutes, whilst the planet bead moved a degree, the planet bead would go its round in a time much nearer a year, than when with the same motions the earth bead is nearer to the Sun. It may be amusing to see the differences according to the distances and the rates of motion of the earth and planet beads. Let the distance of the planet bead from the centre be four times that of the earth bead from the centre; and let the earth bead move twice as fast as the planet bead: of course, when the planet bead moves through one degree in its round, the earth bead moves eight degrees in its round; and, when the earth bead is come round to the place whence it first set out, the planet bead has moved through only forty-five degrees. But this is much farther than Herschell moves in a year, and of course Herschell must be more than four times farther from the Sun than the Earth is.

Now suppose, that the planet bead is nine times as far from the centre as the earth bead is from that centre, and that the earth bead goes over three times as much space in the same time as the planet bead does, that is, when the planet bead goes over one degree in its round, let the earth bead go over twenty-seven degrees in its round—when the earth bead has made a whole round, the planet bead has gone over no more than thirteen degrees and one third of its round. But Herschell does not go farther in his round in one year than thirteen degrees and one third, he must therefore be farther from the Sun than nine times the earth's distance from the Sun.

Let now the planet bead be sixteen times as far from the centre as the earth bead, and let the earth bead move four times as fast in its round, as the earth bead does in its round; that is, when the planet bead moves through one degree in its round, let the earth bead move through sixty-four degrees in its round. When the earth bead has made one complete round, the planet bead moves only through five degrees and five-eighths in its round: but Herschell does not move five degrees and five-eighths in his round in a year, and of course he must be more than sixteen times as far from the Sun as the earth is.

That this is not the motion of Herschell we know from this circumstance, that, if he had this motion, then he would go once completely round the Sun in sixty-four years: but he is a much longer time in going round the Sun, and of course he must in one year move over less space than five degrees and five-eighths of his round in a year.

Let us now suppose the planet bead to be twenty-five times as far from the Sun as is the earth bead; and let the earth bead move five times as fast in its round as the planet bead does in its round; that is, when the planet bead moves over one degree, let the earth bead move over one hundred and twenty-five degrees. Whilst the earth is making one round, the planet bead moves over two degrees fifty-two minutes, and four-fifths of a minute: and of course a planet at such a distance would be a hundred and twenty-five years in moving round the Sun; but we know, that Herschell is not so long in going round the Sun, and of course he is somewhere between sixteen times the distance, and twenty-five times the distance of the Earth from the Sun; and his motion in his orbit is somewhere between five degrees and five-eighths and two degrees fifty-two minutes and four-fifths of a minute.

But, if this is the case, it may be asked, how comes it to pass, that in this year he appears to move between seven and eight degrees in the heavens. This is a very proper question, and it may amuse you to discover the answer to it. In the mean time we will look after the Moon and the other planets.

The Moon, on the first appearance of the stars, in the evening of the 1st, is perceived to have passed the two eastern of the four stars in square, and to have above her, but at a considerable distance, the three first stars of the Ram. Just above her is the fourth star of the Fishes, near to which she passes at forty-eight minutes past ten. On the 2d, she is seen to have approached much nearer to the three first stars of the Ram, which are above her; the small stars near to and below her being the small stars in the connecting band of the Fishes, effaced by her superior brilliancy. As the stars in the Ram directly above her attract notice, by turning our eyes lower down, and to the south, we shall notice Menkar, or the first star in the Whale, and the stars in the head of that constellation. On the 3d she is on the meridian at fifty-two minutes past four; at her first appearance, is below the three stars in the Ram; and at six, is within five degrees of the third or lowest of these three stars. Below her to the south is Menkar, and the small stars in the head of the Whale: but she does not pass the line between the first of the Ram and the first of the Whale this night: above her at a considerable distance are the Pleiades, and she is thirty-five degrees ten minutes from Aldebaran.

On the 4th the Moon is on the meridian at thirty-seven minutes past five, having then directly below her the first of the Whale, and above her Algol, or the second of Perseus; to the east, above her, the Pleiades, and to the west, at a greater distance, the first of the Ram. During the evening these objects round the Moon will call our attention, and at her first appearance we may observe that she is nearly in the line between the first of the Ram and the second of Orion. At six o'clock she is twenty-three degrees twenty-five minutes from Aldebaran, and fifty-five degrees forty-three minutes from the first of Pegasus; and at nine she is twenty-one degrees fifty-seven minutes from Aldebaran, and fifty-seven degrees eight minutes from the first of Pegasus.

On the 5th the Moon is on the meridian at twenty-five minutes past six, having directly over her head the Pleiades, at the distance of four degrees, and she is now very near to the ecliptick, which she will have passed over soon after midnight. As she entered her second quarter only yesterday, it is evident that we cannot now expect an eclipse. Almost directly below her, but in the lower region, is the third of the River; Aldebaran with the Hyades below her to the east, and still farther down Orion, having under him, but more eastward, Sirius, enriches the south-eastern prospect; and on the west we note the three first stars of the Ram, and Menkar with the stars in the head of the Whale. At six o'clock she is fifty-four degrees thirteen minutes from the second of the Twins, east of her; and sixty-seven degrees sixteen minutes from the first of Pegasus, west of her; and at nine o'clock she is forty-degrees forty-six minutes from the second of the Twins.

On the 6th, the Moon is on the meridian at a quarter past seven, having directly under her Aldebaran, at the distance of about five degrees. To the east, above her, is the second of the Bull, and to the west, but nearer to her, the Pleiades. Orion is below her to the east, and Menkar, with the stars in the Whale's Head, to the west. At six o'clock she is forty-two degrees sixteen minutes from the second of the Twins; and at nine, forty degrees forty-six minutes from this star, which is to the east of her; and at six, she is thirty-five degrees thirty-three minutes from the first of the Ram; and thirty-seven degrees four minutes, at nine, from this star, which is to the west of her.

On the 7th, the Moon is on the meridian at seven minutes past eight, being near to the sixth of the Bull, or tip of the southern horn, which star she passed at fifty-nine minutes past six, but at too great a distance for an occultation. She is now nearly in a line with the second of the Bull and the first of Orion, and in a line also with Aldebaran and the second of the Twins, but much nearer to the former star. The second of the Bull is above her, but to the west of the meridian. She is directing her course towards the thirteenth of the Twins, the star above the third; and the group around her, consisting of the third and first of Orion, the third of the Twins, the second of the Bull and Aldebaran, is worthy to be noted, and to be pointed out to those who are not acquainted with these objects. At six o'clock, she is sixty-five degrees thirty-eight minutes, and at nine, sixty-four degrees two minutes from Regulus, or the first of the Lion, who is to the east of her: and to the west of her is the first of the Ram at six, at the distance of forty-seven degrees fifty-six minutes, and at nine of forty-nine degrees thirty-one minutes.

On the 8th, the Moon is on the meridian at one minute past nine, having passed the thirteenth of the Twins at seven minutes past five. The third of the Twins is below her at the distance of about four degrees, and the seventh and twelfth above her to the west of the meridian. High above her, to the east of the meridian, are the two first stars of the Twins; below which we notice the first and second of the Lesser Dog; and almost directly under the Moon, but to the east of the meridian, is Sirius, the second of the Greater Dog being just to the west of the meridian; of course, the constellation of Orion is higher up, and at a greater distance from the meridian. At six, she is fifty-two degrees forty minutes, and at nine fifty-one degrees from Regulus, who is to the east of her; and from Aldebaran, who is to the west of her, she is distant, at six, twenty-seven degrees thirty-one minutes, and at nine, twenty-nine degrees ten minutes. During the night, the stars encircling her cannot fail of attracting attention.

On the 9th, the Moon is on the meridian at fifty-six minutes past nine, being directly under the first of the Twins, and almost in a line with the second of the Twins and the first of the Lesser Dog, both being near to, but to the east of the meridian, and she is very nearly midway between them, but nearest to the second of the Twins. She is directing her course to the first of the Crab, the stars in which constellation will, from her superior brightness, be scarcely visible. She is distant from Regulus, or the first of the Lion, at six, thirty-nine degrees eighteen minutes, and at nine, thirty-seven degrees thirty-six minutes; and from Aldebaran, at six, forty degrees fifty-two minutes, and at nine, forty-two degrees thirty-four minutes.

On the 10th, the Moon is on the meridian at fifty minutes past ten, having above her, to the west, the two first stars of the Twins, and below the two first stars of the Lesser Dog, Sirius being below them. To the east of her are the two stars called the first of the Crab, which she will pass soon after Sun-rise on the morrow, and directly above her are the third and fourth of the Crab, commonly called the northern and southern Asses, between which is the remarkable Nebula.

Below her, but to the east of the meridian, are the small stars in the head of the Hydra. At six o'clock she is distant from Regulus twenty-five degrees thirty-eight minutes, and at nine, twenty-three degrees fifty-five minutes; and from Aldebaran she is distant, at six, fifty-four degrees forty-one minutes, and at nine, fifty-six degrees twenty-seven minutes.

On the 11th, the Moon is on the meridian at forty-four minutes past eleven, and, of course, is very near the full; but we cannot expect an eclipse, because she is nearly five degrees from the ecliptick.* Above her, to the east, are the stars in the Lion's head, and about nine degrees from her is Regulus. Directly below her is the first of the Hydra, and, of course, below her, but to the west of the meridian, are the small stars in the head of the Hydra. To the east of her are the fifteenth and sixteenth of the Lion, the first of which she passes at two hours thirty-nine minutes past midnight. At nine, she is sixty-two degrees fifty-seven minutes from the first of the Virgin; and she is distant from Aldebaran, at

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[*] See the volume for 1807, pages 35, 36, 55, 74.

six, sixty-eight degrees fifty-four minutes; at nine, seventy degrees forty-two minutes; and at twelve, seventy-two degrees thirty-one minutes.

On the 12th she rises under Regulus, and during the night is observed to recede from him, but not to pass the line drawn from the sixth through the third of the Lion, and produced. She is distant from the second of the Twins, at six o'clock, forty-one degrees fifty-eight minutes; at nine, forty-three degrees forty-four minutes; and at twelve, forty-five degrees and a half. On the 13th, she rises nearly at the same time with the second of the Lion, who is then considerably to the north of her; and as she mounts the heavens, we may note above her the stars in the constellation of the Lion, the first being now at a considerable distance from her, and at midnight she is nearly in the line drawn from her through the second of the Lion and Charles's Heart. Below her are the small stars in the Cup, and to the east of her the second of the Virgin, one of the five stars in triangle. At nine o'clock, she is fifty-eight degrees three minutes from the second of the Twins. On the 14th, she rises under the Lion, but at a considerable distance from this constellation, having directly above her the second of the Virgin; and as she mounts the heavens, we shall perceive above her the five stars in triangle of the Virgin, and below her the first of this constellation, to which she is bending her course. At nine, she is thirty-five degrees thirty-one minutes from the first of the Lion.

On the 15th, the Moon rises under the five stars in triangle of the Virgin, being nearly in the line drawn through the second of the Lion and the third of the Virgin, the star in the point of the triangle nearest to her. She is soon followed by the first of the Virgin, and her approaches to that star will be very visible, as she passes it at three hours fifty-eight minutes past midnight; and at midnight, she is fifty-one degrees fifty-three minutes from the first of the Lion. On the 16th, she rises under the first of the Virgin, and is soon followed by the first of the Balance; but she is nearest to the latter star. She is now in the neighbourhood of Herschell, and passes him in the morning of the 17th, when we may observe above her the tenth and eleventh of the Virgin, the latter being the lowest and nearest to her, and also the directing star to Herschell during this year. On the 18th, she rises in the morning under the first of the Balance, being within the oblong of the Balance; but she passes the line between the third of the Balance and the third of the Scorpion, the two eastern stars of the oblong, about day-break; to the east of her is Saturn; and the two first stars of the Balance, with the Moon and Saturn, form an object of attention to the traveller by night, to whom the first of the Virgin to the west, and the first of the Scorpion to the east, will afford additional interest.

On the 19th, the Moon rises under the second of the Scorpion, which she passed at nineteen minutes past ten of the 18th, and is soon followed by the first of the Scorpion. As she mounts the heavens, the two first stars of the Balance, with Saturn above her and Antares below her, form a beautiful prospect from the south to the south-east. On the 20th, she rises to the east of the two first stars of the Scorpion; and as she mounts the heavens, is evidently perceived to be directing her course to the twelfth of the Archer. On the 21st, she rises near to the twelfth of the Archer, and is followed by Venus; to whom, as the Moon mounts the heavens, she is perceived to be nearer than to the first of the Scorpion. On the 22d, she rises nearly with the small stars in the head of the Archer to the east of her, and is now soon followed by Venus, and the two first stars of the Goat. On the 23d, she rises nearly at the same time with Venus, being between this planet and the two first stars of the Goat; and these objects will, during the morning, before dawn, form a pleasant prospect. She passes the second of the Goat at noon, and rises, of course, on the 24th under it; and being now so near the Sun, we will leave her, observing only, that she is as a new Moon on the 26th, when there cannot be an eclipse, as she is upwards of four degrees from the ecliptick.

Mercury is a morning star till the 7th, when he comes to his superior conjunction, or the point when the Sun is between that planet and the Earth. Of course, he is an evening star after the 7th; but he is so near the Sun at rising and setting during the whole month, that he will be but little observed. He cannot appear as a spot on the Sun's disk at the superior conjunction, because he is then upwards of two degrees from the eclipt ick, and he is south of the southern rim of the sun's disk, at the distance of upwards of a degree and three quarters.

Venus is a morning star, but not high in the heavens, at sun-rise. She will, however, anticipate the dawn very considerably, and be noticed by the early risers. On the third she passes the twelfths of the Archer, at the distance of only nineteen minutes from the first twelfth, and forty minutes from the second twelfth, both stars being to the north of her. She then directs her course to the stars in the head of the Archer, passing between the fifteenth and sixteenth stars, being on the 13th north of the fifteenth, and at the distance of only thirty-three minutes; and on the 14th, being distant only five minutes from the sixteenth, the star being north of her. From this time, quitting the head of the Archer, she directs her course to a point under the two first stars of the Goat, and will form with them a very pleasing object at the end of the month, being on the last day nearly in a direct line with these two stars. The Moon passes her on the night of the 22d. The course of Venus during the month is through about thirty-five degrees.

Mars is an evening star, but setting so soon in the evening that he will not be much noticed. His course is through about twenty-three degrees, beginning with a point under the eighth of the Serpent-bearer, passing, on the 19th, the line drawn through the two western of the four stars in square; but he does not reach the line through the two eastern of these stars. The Moon passes him on the 27th.

Jupiter is an evening star, but affords fewer opportunities of being observed than Mars, and he is too near the Sun for his moons to be visible. On the 1st he sets under Mars, at the distance of only about eight degrees, and his conjunction with the Sun is on the 14th, near noon; from which time he becomes a morning star. The Moon passes him on the 25th.

Saturn affords excellent opportunities of being examined by the zealous astronomers this month, as he rises between one and two in the morning on the 1st of the month, and about midnight at the end of the month. He keeps near to the third of the Balance during the month, having a motion of only about three quarters of a degree. Nearer to him are the small stars under the name of the sixth of the Balance. The two first stars of the Balance above him, and the two first of the Scorpion below him, cannot fail of fixing our attention. The Moon passes him on the 18th.

Herschell rises between twelve and one in the morning, and is stationary on the 8th, and so near to the eleventh of the Virgin, that we cannot fail, from the directions given last month, of discovering him; and the powers of the naked eye may be tried with respect to him. The Moon passes him on the 17th, early in the morning.

The Sun's apparent diameter on the 1st is thirty-two minutes thirty-one seconds; and on the 25th, thirty-two minutes twenty-one seconds. The Moon's apparent diameter first increases, and then decreases. On the 1st, it is twenty-nine minutes thirty-eight seconds; from which time it increases to the 14th, when it is thirty-three minutes; it then decreases to the end of the month, being on the last day twenty-nine minutes thirty-two seconds.

The appearances of the fixed stars at any time of the night will be discovered, by consulting the following table, and thence referring to the position belonging to the hour, as it is described in the volume for the year 1806.

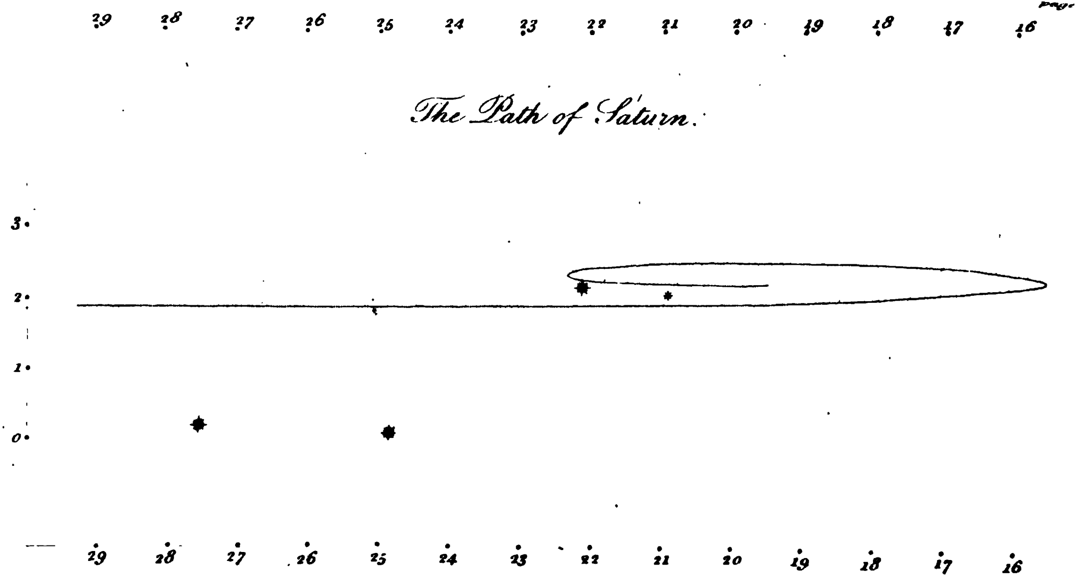
Pos.	1		8		15		22	
	h.	m.	h.	m.	h.	m.		
XI.	4	32	4	4				
XII.	6	38	6	10	5	42	5	15
I.	8	28	8	0	7	32	7	5
II.	10	31	10	3	9	35	9	8
III.	0	20	11	52	11	24	10	57
IV.	2	41	2	13	1	45	1	18
V.	4	32	4	4	3	36	3	9
VI.	6	28	6	0	5	32	5	5

We may observe that this month presents to us the most favourable opportunities of making ourselves fully acquainted with the stars in the twelfth, first, and second positions, as they appear at convenient hours in the evening. Orion is a particular feature in them all; and the volume for 1806 will, I hope, be frequently in your hands, beginning with the first day, that at thirty-eight minutes past six you may point out with ease the stars of the first and second magnitude, which then adorn the heavens. Every night in succession the Pleiades are on the meridian a little later; and this time you may find with sufficient accuracy by noting the times on the 8th, 15th, and 22d of the month, when the table points them out.

MARCH, 1808.

WHAT an immense difference there is between book learning and real learning! By book learning I mean the filling of the head with notions out of books; to which the mind is brought to give its assent, and by degrees the person is said to believe them, merely because he repeats what he has learned out of these books. The same thing may have been repeated over and over again for several thousand years, yet it does not follow that it is true: and I call the man a mere book learned man, who thus repeats other people's notions, and utters things which he has not himself properly digested. On the other hand, the really learned man does not inquire whether a notion has been repeated over and over again for so many thousand years, or was advanced by a person held in reputation for wisdom: but he examines the notion by itself, and in all its bearings; and, when he has a just conception of it, and sees that it is well founded, then the knowledge is his own, and it matters not to him whether it was

PLATE II.



The Path of Saturn.

J. Bye sculp.

held or not by this or that man, whether millions of millions of people believe it to be well or ill founded.

The unhappy men who threw Galileo into prison, were men of book learning. Galileo himself was a man of real learning. The book learned men had read it over and over again, that the Earth stood still; and they were in a passion when this favourite notion of theirs was contradicted. How impudent, they said within themselves, must this man be, who dares to contradict what so many philosophers, so many saints, so many cardinals, so many popes: what the whole church believed, and what the scriptures themselves affirm! But the fact was, that these book learned men were really guilty of impudence: for they were not ashamed to persist in their book learning error, and had not the true modesty to examine an opinion, though it might be in contradiction with that which they had, during their whole life, entertained.

Galileo had read, probably, many more books than most of his adversaries; but he was not content with merely reading the books, he examined the opinions contained in them, and he saw no reason for giving his assent to an opinion, merely because it had passed current for several ages before he was born. He tried the notions of the Earth's moving, or of being at rest by themselves, and much in the manner that we are doing with our earth and planet beads; and he found the notion of the Earth's being at rest not compatible with the motions of the heavenly bodies; he denied, therefore, the rest of the Earth; and, instead of answering his arguments, his adversaries threw him into prison. Happily for us, that foolish spirit does not prevail in this part of the world, and in these times. Men are expected to give reasons for the opinions they hold; and, if they fly into a passion when their opinions are contradicted, they excite only a smile at their want of good breeding.

We have seen by our planet and earth beads, that if a person stood in the Sun, and noticed the motions of the Earth and Herschell round him, then, when the Earth had gone round once, Herschell would not have gone five degrees and five eighths of a degree in his orbit, and yet he would have gone more than two degrees fifty-two minutes in his orbit. The inhabitant of the Sun would mark his path by certain stars just as we do; but the great difference is this, that he would see the planet always moving directly, that is, from west to east. Now we, looking at Herschell, refer him to one place in the heavens, when he was in the straight line with us and the Sun; and though he moves directly the following days, yet, as we move faster, he will appear to us to go backward; and, if we draw a line from the earth bead to the planet bead, we shall observe, at first, that it is directed to some point to the west of the line, connecting the Sun, Earth, and planet; and this point is continually moving for some time more to the west. As the earth bead is moved on to the point, where the planet bead, the Sun, and the earth bead are again in the same straight line, the Sun being now between them, we shall observe that the line connecting the Earth and Herschell is directed to a point to the east of the point to which it was first directed; and, as the earth bead is brought round to its original position, the line connecting the two beads is successively directed to points more and more to the eastward; till at last, it changes its direction, and is gradually directed to points again more and more to the westward.

The stars in the heavens are at such a distance, that, whether a person stands in the Earth or in the Sun, they appear to him to be exactly in the same places; of this we may be sure, because it makes no difference to us whether we look at the same stars one night, or a night six months after: though the interval of six months makes a difference of between one and two hundred millions of miles in our distance from the fixed stars. The line then connecting the earth bead and the planet bead, as it is directed to points to the west and east of the lines drawn from the Sun to the planet at the beginning and end of the year, must direct to points in the heavens to the east and west of those points where the inhabitant sees the planet at the beginning and end of a year. Of course, though the planet Herschell does not move through five degrees in his orbit in a year, yet, to us looking at him, during our change of motion for a year, he may appear to move through a much larger space than five degrees. To measure the exact space that he would appear to move through in the heavens, we must adopt another contrivance; and, whilst you are thinking of it, we may attend to the motions of the other heavenly bodies during this month.

On the 1st the Moon is under the three first stars of the Ram, being at her setting only four degrees from the third of them; the first of the Ram above her, and the first of the Whale below and to the south of her, will be noticed; and, it is evident that she will pass the line between these two stars on the next day. At nine she is thirty-seven degrees fifteen minutes from Aldebaran. On the 2d, the Moon is perceived to have passed the line between the first of the Ram and the first of the Whale, but to be near that line, and nearest to the first of the Ram; the Pleiades are above her and at some distance; and at nine she is twenty-five degrees thirty-three minutes from Aldebaran. On the 3d, she passes the ecliptick between noon and midnight; but there cannot evidently be an eclipse, as she is so far advanced in her first quarter; at her first appearance she is seen under and near to the Pleiades, the first of the Whale being under her, and almost in the same line with her and the Pleiades; Aldebaran is, of course, more to the south; and the stars around the Moon, the three of the Ram, the Pleiades, Aldebaran, and the Hyades; Menkar and the stars in the head of the Whale, will excite our attention; Orion, farther to the south, increases the interest of the scene. At nine, she is fifty-six degrees thirty-six minutes and a half from the second of the Twins.

On the 4th, the Moon is on the meridian at nine minutes past five; and at eight, she is near to the fifth of the Bull, or star in the Bull's eye, Aldebaran being below it. In this last situation she is in a line with the Pleiades and the first of Orion, but much nearer to the former stars; and in a line with the second of the Bull above her, and Menkar below her, but much nearer to the former star. At nine she is forty-four degrees fifty-four minutes from the second of the Twins. On the 5th, she is on the meridian at fifty-nine minutes past five; and at eight, above her, is the second, or tip of the northern horn of the Bull; and near her, the sixth of the Bull, or tip of the southern horn, which she passes before break of day; under her are Aldebaran and Menkar, with whom she is nearly in a straight line. Orion under her makes a conspicuous figure to the south of her. At nine, she is sixty-eight degrees forty minutes from the first of the Lion.

On the 6th, the Moon is on the meridian at fifty-one minutes past six; and at eight, she is nearly in the line between the second of the Waggoner and the first of Orion. The sixth of the Bull is now near to, but to the west of her; the seventh and twelfth of the Twins are above her; and below them, the thirteenth of the Twins, to which she is bending her course; this star being known by being between the twelfth and the third, the bright star in the foot of the Twins. At nine, she is fifty-six degrees seven minutes from the first of the Lion. On the 7th, she is on the meridian at forty-four minutes past seven, being then nearly in a line between the third and second of the Twins, the third being below her and to the west, the the second above her and to the east of the meridian, but she is nearest to the third; just above her is the sixth, and still higher the fourth of the Twins. In this position we cannot fail of noticing above her the two first stars of the Twins, and below her the two first of the Lesser Dog, all being to the east of the meridian: on the meridian below her the Greater Dog, Sirius being to the west, and the fourth star of this constellation to the east of the meridian. Orion and the Bull, higher up to the west of the meridian, will make this a very brilliant scene. At nine she is forty-three degrees eleven minutes from the first of the Lion.

On the 8th, the Moon is on the meridian at thirty-eight minutes past eight, having above her the two first stars of the Twins, and below her the two first stars of the Lesser Dog, all to the west of the meridian; to the east, below her, are the small stars in the head of the Hydra; the first of the Lion is to the east of her, and at nine is distant twenty-nine degrees fifty-four minutes, and she is fifty degrees twenty-two minutes from Aldebaran. On the 9th, she is on the meridian at thirty-two minutes past nine, being to the east of the first star of the Crab, having passed between this star and the Earth about six o'clock; under her, to the west of the meridian, are the small stars in the head of the Hydra; and much lower down, to the east of the meridian, the first of the Hydra; the first of the Lion is to the east of her, and the stars in his head are of course above her to the east of the meridian. At nine, she is sixty-nine degrees twenty-four minutes from the first of the Virgin, and sixty-four degrees sixteen minutes from Aldebaran.

On the 10th, the Moon is on the meridian at twenty-six minutes past ten, being directly under the Lion's head, having passed the sixteenth of the Lion at forty-eight minutes past nine;

above her, at the distance of little more than five degrees, and a little to the east of the meridian, is the first of the Lion; and below her, but at a considerable distance, and to the west of the meridian, is the first of the Hydra. We may notice in this position the seventh, third, and sixth of the Lion above the first, and the second at a considerable distance to the east. At nine, she is fifty-four degrees fifty-nine minutes from the first of the Virgin; and thirty-seven degrees twenty-three minutes from the second of the Twins. On the 11th, she is on the meridian at twenty minutes past eleven, being directly under the body of the Lion, and nearly at equal distances from the first and second of this constellation; both these stars are above her, the first to the west, and the second to the east of the meridian. Almost directly above her are the eighth and fourth of the Lion; both stars being higher than the second, but the eighth is nearly at the same height as the second; below her are the stars in the Cup. At nine, she is forty degrees twelve minutes, and, at twelve, thirty-eight degrees twenty minutes from the first of the Virgin; and at nine, she is fifty-one degrees thirty-seven minutes, and, at twelve, fifty-three degrees twenty-six minutes from the second of the Twins.

On the 12th is full Moon at twenty-one minutes past two in the afternoon, but there can be no eclipse, because she is above four degrees from the eclliptick. She rises nearly at the same time with the second of the Virgin, one of the five stars in triangle, and to the east of her; and higher up, but farther to the east, is the second of the Lion; the first of the Lion is almost directly above her; and, as she mounts the heavens we notice above her the stars in the Lion, and the five stars in triangle to the east of her. At midnight, the Moon, the second of the Virgin, and the second of the Lion are nearly in the same straight line, the two stars being above her. At nine, she is twenty-nine degrees sixteen minutes; and at twelve thirty-one degrees seven minutes from the first of the Lion.

On the 13th, the Moon rises under the five stars in triangle of the Virgin, being almost in the same line with the fifth and fourth, two stars in the eastern leg; she is followed within the hour by the first of the Virgin. As she mounts the heavens, under her we perceive the stars in the Crow; and at nine, she is forty-four degrees thirteen minutes from the first of the Lion, and at midnight, forty-six degrees five minutes from this star. On the 14th, she rises under and near to the first of the Virgin, having passed this star at forty-six minutes past noon, at the distance of only forty-one minutes; as she mounts the heavens the distance between her and the star will be apparently increasing. At nine, she is fifty-nine degrees eleven minutes, and, at twelve, sixty-one degrees three minutes from the first of the Lion. On the 15th, she passes Herschell in the morning, and rises at night nearly at the same time with the first of the Balance, as she passes this star at four minutes past eleven; of course, at her rising, the first of the Virgin is above her at some distance, and is to the south of her; Saturn soon follows her, and as she mounts the heavens the two first stars of the Balance and Saturn, followed by the two first stars of the Scorpion, make a distinguished appearance.

On the 16th, the Moon passes the eclipticks, but there can be no eclipse, as she is in her third quarter, and so far from the full. She rises near midnight, and is soon followed by the second of the Scorpion, which she passes at twelve minutes past five of the morning of the 17th. Soon after her rising we shall remark Saturn above her, the second of the Scorpion near her, and Antares, or the second of the Scorpion, below her. The two first stars of the Balance, at a greater distance, will increase the interest of the scene. On the 18th, she rises in the morning nearly at the same time with Antares, who is to the south of her, and nearly at an equal distance from her and the second of the Scorpion; Saturn and the two first stars of the Balance are, therefore, above her to the south. On the 19th, she is, at her rising, seen to the east of Antares, and bending her course to the twelfth of the Archer, which she passes at thirty-four minutes past nine in the morning. On the 20th, she rises near the small stars in the head of the Archer, and is bending her course to the two first stars of the Goat, which soon follow her rising. On the 21st, she is seen much nearer to the two first stars of the Goat, as she passes the second at thirty-three minutes past six in the afternoon. On the 22d, she rises under and soon after the two first stars of the Goat. On the 23d, these two stars are seen at her rising at a considerable distance from her, and she is soon followed by Jupiter and Venus, being nearer to Venus than to those two stars. On the 24th, she rises over Venus and directly over Jupiter; and as she mounts the heavens is seen nearly in a line and midway between the first of the Water-bearer and this latter planet. On the 25th, she rises nearly at the same time with Jupiter and Venus, who are to the south of her; and on the 27th is new Moon at eleven minutes past two in the morning. At this time there can be no eclipse, as she is upwards of three degrees from the eclíptick.

On the 29th, we shall notice the Moon again in the evening, having got so far from the Sun's beams as to form a beautiful crescent; and, if it is a clear evening, in this situation she is particularly calculated to gratify the spectator who looks at her through a telescope; she is now between the stars in the head of the Ram and those in the head of the Whale, but much nearest to the former stars. On the 30th, she passes the ecliptick, but of course there cannot be an eclipse, as she is so far advanced in her first quarter; she is now in a conspicuous situation between the three stars in the head of the Ram, the stars in the head of the Whale, and the Pleiades, but she is nearest to the Pleiades. On the 31st, she is very near the line between the Pleiades and Aldebaran, and nearly midway between these two stars.

This month is unfavourable to an evening observer, as far as the planets are concerned. Mercury and Mars are evening planets; Jupiter and Venus morning planets; Saturn and Herschell night planets.

Mercury is an evening planet in the former, and a morning planet at the latter part of the month. His inferior conjunction is at half past three in the afternoon of the 22d, but he cannot appear as a spot on the Sun's face, as he is then upwards of three degrees from the ecliptick. For the first two or three evenings he will be very clearly seen in the west by south soon after sunset; but in the mornings at the end of the month the Sun rises so soon after him, that he will be lost in the splendour of its beams.

Venus is a morning star during the whole month. She moves through about twenty-eight degrees, being on the first under the two first stars of the Goat, a little to the east of the line passing through them, and on the last of the month under the Water-pot, being only forty-three minutes from the eleventh of the Water-bearer, this star being to the north of her. On the 8th, she passes the eighth of the Goat, this star being thirty-three minutes to the south of her;

and on the 9th she passes the eclipticks. On the 19th, we shall see her over the small stars in the tail of the Goat, and observe that she is bending her course towards Jupiter. From this time the daily approaches of Venus towards him will gratify the morning observer, and the more so, as, on the 28th, they will be so near to each other, that the distance between them will be only five minutes and a half, Venus being the southernmost. So near an approach may induce many a person to breathe the air of the spring before sun-rise; and, if they have a tolerable glass, the aspect of Venus through it, with Jupiter and his moons, will be a sufficient reward for their exertions. About five in the morning will be a good time; and the glass may afterwards be turned towards the south-west, to examine Saturn and his moons; and further westward Herschell will be discovered. From the 28th, Venus is receding from Jupiter: the Moon passes her on the 24th.

Mars is an evening star, but the Sun's rays will prevent our observation of him, as he will be on the horizon at dusk.

Jupiter is a morning star, and moves through about seven degrees during the month, under the eighth of the Water-bearer, to which star a small one is near, called the seventeenth of that constellation. The moon passes him on the 24th. The difference in the motions of Jupiter and Venus, as well as in their respective apparent magnitudes, will form a pleasing object of contemplation.

Saturn is on the meridian at twenty-six minutes past four in the morning of the 1st, and near three on the 25th. On the 1st he is stationary, from which time he has a regressive motion of about three quarters of a degree, during the month. We shall see him, therefore, near to the third of the Balance, the star above him, and the small stars below and near to him are the three under the name of the sixth of the Balance. The Moon passes him on the 23d, in the afternoon.

This month is particularly favourable for observations on Herschell, as he is on one day so near to the eleventh of the Virgin, that his distance from that star is computed to be only three-quarters of a minute, the star being to the south of him. This happens on the 21st; and it may justly excite our admiration of the powers of man, that he should be able to calculate so nearly the path of a body at such an immense distance from us, a body not visible to the naked eye, or at least only to those eyes which are gifted with extraordinary strength of vision. As during the whole month his motion is less than a degree, we cannot fail, if we choose to see him, to have opportunities of discovering him by a glass of very slight power. He is on the meridian on the 1st at twenty minutes past three in the morning, and on the 21st, at four minutes past two. At these times the first of the Balance and the first of the Virgin are in the upper part of the lower region; the first of the Balance to the east, and the first of the Virgin to the west of the meridian. The eleventh of the Virgin and the planet Herschell are nearest to the first of the Balance. The Moon passes Herschell on the 14th in the morning.

Four planets will be visible at the same time above the horizon this month, namely, Venus, Jupiter, Saturn, and Herschell. When Jupiter has risen, then Venus and Jupiter will be in the eastern, Herschell and Saturn in the western heavens.

The apparent diameter of the Sun, on the 1st, is thirty-two minutes nineteen seconds, and on the 25th, thirty-two minutes six seconds. The apparent diameter of the Moon first increases, then decreases, and finally increases. On the 1st, it is twenty-nine minutes thirty-two seconds, and from this time it increases to the 13th, when it is thirty-three minutes twenty-six seconds; it then decreases to the 28th, when it is twenty-nine minutes twenty-eight seconds, increasing afterwards to twenty-nine minutes fifty seconds, with which it closes the month. On the evening of the 4th it is half a degree.

The positions of the stars will be known by consulting the following table, and referring to the description of the positions in the volume for 1806.

Pos.	1		8		16		24	
	h.	m.	h.	m.	h.	m.	h.	m.
I.	6	38	6	12	5	43		
II.	8	41	8	15	7	46	7	17
III.	10	30	10	4	9	35	9	6
IV.	0	51	0	25	11	56	11	27
V.	2	42	2	16	1	47	1	18
VI.	4	38	4	12	3	43	3	14
VII.	6	38	6	12	5	43	5	14

APRIL, 1808.

IT is a very difficult thing to form a true notion of ourselves and the things around us. To know the nature of the heavenly bodies, and their motion, is not necessary to every one, nor is it a task imposed upon us: but it is a delightful amusement, and by it our mind is enlarged: it expands itself over the great works of creation, and feels new sources of admiration of the greatness and wisdom of the Creator. To understand his works aright, we must conceive ourselves to be in the Sun, the centre of our system, whence every motion is perceived to be performed with the utmost regularity. The irregularities that we notice in the motion of the heavenly bodies, are owing to the motion of the body on which we are placed: yet the ingenuity of man has contrived to discover from the irregularities, that he perceives, the manner in which the system presents itself to an inhabitant of the Sun, who perceives the whole without irregularity.

In the moral world men have not been so successful: the irregularities there are more frequent: for every man taking a partial view of his own situation, forms continually rash and erroneous judgments of the transaction of past and present times; and his conjectures on the future equally partake of his misconceptions. In the heavenly world we must place ourselves in the Sun to form a true notion of our system; for the moral world the Sun of righteousness can alone enlighten our paths, and without the aid of the Scriptures all is darkness and confusion. How happy are we that such a guide is given to us in an affair of the utmost importance; in lesser things we are left to our own sagacity; and many ages passed over the heads of men before they could rest with confidence in any system.

As we look at the heavens we trace the path of a planet among the stars. The stars appear to us to be fixed, as it were, in the roof of the heavenly vault, and some time elapses before we discover that they have changed their situation; not, indeed, with respect to each other, but with respect to ourselves. By attentively marking the height of the Sun at noon we may learn to form an idea of the path it appears to describe in the heavens during a year. This is a circle, and the earth is in the centre of it. Of course, if we draw a circle round our earth bead, we will say at the distance of three inches from it, this circle may represent the eclíptick, or the path the Sun appears to describe in the heavens. When, therefore, the Sun, the Earth, and Herschell appear in the same straight line, if the Earth is between the Sun and Herschell, a line drawn from the planet bead through the earth bead to the Sun, will cut the circle in two places. The place nearest the planet bead is the point where the inhabitant of the Earth sees the planet; the other point is where the inhabitant of the Earth sees the Sun, and in this case the Sun and the planet are in opposite parts of the heavens, or the planet is said to be in opposition.

If the Sun is between the planet and the Earth, then the Sun would cover the planet from the sight, and the planet is said to be in conjunction; the line in this case, from the earth bead to the planet bead, cutting the circle in that point, where the Sun appears to be in the heavens. This circle we should divide into twelve equal parts, each division representing the length of a sign in the heavens, for the ecliptick is divided in this manner: each sign is divided into thirty parts, each part being obviously equal to a degree. The first sign is the sign of the Ram, and we may suppose that the line, from the centre of the pasteboard to the planet bead, passes over the earth bead exactly at the beginning of a degree, and this degree we may call the first of the Ram.

At the end, then, of every thirty degress in succession, we put the letters II. III. IV. V. VI. and so on to the number XII. to denote the beginning of every sign; and at every five degrees in succession, we put the figures 5, 10, 15, 20, 25, 30, to assist us in finding out a degree in each sign.

By means of the circle drawn round the earth bead, we can mark the place in the heavens where a planet is seen on any day in the year, but this will not be the place in which it appears to the inhabitant of the Sun. To mark the place, where the planet appears to the inhabitant of the Sun, we must, in like manner, draw a circle round the Sun, and divide it, like that round the earth bead, in twelve parts, and mark it in the same manner. The line, also, drawn from the centre of the pasteboard, to the earth bead, and to the planet bead, will, in this case, cut the circle round the centre representing the Sun, at the beginning of the first sign on the division representing the Ram.

The earth bead being kept in the position above-mentioned, we may move the planet bead round the centre, or Sun, taking care that it should go in the order of the signs; that is, the line from the centre to the planet bead should pass successively over the figures I. II. III. IV. &c. in that order, which is to represent the motion of the planet from west to east. When it is stopped in any place, let us suppose in the third sign, at the twentieth degree, then the line from the earth bead to the planet bead will cut the circle round the earth bead in a different sign. Let it cut the circle in the fourth sign, and at the eighteenth degree; then, if we move the planet bead on its thread nearer or farther from the centre, we shall notice that the line, connecting the earth and planet beads, cuts the circle round the earth bead in different places; and of course, if an inhabitant from the Sun should see two planets in the same spot in the heavens, the inhabitant of the Earth would see them in two very different places.

The point in the heavens, where an inhabitant of the Sun sees a planet in the heavens, is called its heliocentrick place, or Sun's centre place: helios being Greek for the Sun; and it is the misfortune of our country that our words for science are taken from the Greek. It is no great consequence, when a person has learned the meaning of the term: for it is just as easy to remember the word helios as the word Sun, to fix in our minds that the glorious luminary in the heavens is meant by either term. As we have a term to express the place of a planet in the heavens, when seen from the Sun, it is natural to expect that a word will be found to express its place also, where it is seen to be from the Earth. Such a word is used, and this is also borrowed from the Greek: and the place is called geocentrical, gee being Greek for the Earth. Thus we have two terms to express the place of a planet in the heavens, as seen from the Sun or Earth; the heliocentrical place, and the geocentrical place: that is, the Sun's centre place, and the Earth's centre place; and whenever the term is used, we can readily conceive that this place is found by drawing a line from the Sun to the planet, or the Earth to the planet, and this line produced, will mark the place in the heavens, according to the situation of the observer.

One great point in the heavens, whence our distances are measured, is the first of the Ram; and, when we have drawn our line from either the Sun or the Earth to the planet, we speak of its place by the number of degrees that place is from the first of the Ram; thus, if this place is in two signs four degrees from the first of the Ram, we say that its longitude is *two signs four degrees*; by longitude, meaning the arc of the circle between the beginning of the first of the Ram and the planet's place in this circle, or the point where the line to the planet bead cuts the circle. If the planet is viewed from the Sun, then its longitude is called its heliocentrical longitude; if it is viewed from the Earth, then we call its longitude its geocentrical longitude. We may amuse ourselves by placing the planet bead in various points, and then comparing together its heliocentrical and geocentrical longitudes; but farther inquiries on this subject we will defer for the present, and attend to the appearances that are to take place in the heavens during this month.

On the 1st, the Moon is at her first appearance almost in the direct line between Aldebaran and the second of the Bull, Aldebaran being below, and the second above her. The star near her is the ninth of the Bull, which she passes at twenty-four minutes past seven; she is directing her course towards the sixth of the Bull. The Pleiades are below her to the west, and Orion and Sirius are conspicuous towards the south-west. At nine, she is seventy-two degrees seventeen minutes from the first of the Lion. On the 2d, she is perceived to have moved to a considerable distance from Aldebaran, and to be to the east of the sixth of the Bull, or tip of the southern horn, as she passed this star about noon, and she is now directing her course under the seventh and twelfth of the Twins towards the thirteenth; these three stars are therefore seen above her, the seventh being nearest to her, the thirteenth nearest to the third, the brighter star below it. Orion is below her, and the second of the Bull, or tip of the northern horn, above her to the west. At nine, she is sixty degrees four minutes from the first of the Lion.

On the 3d, she is perceived to have passed the thirteenth of the Twins, which she did at twenty minutes past ten this morning. Below her, is the third of the Twins, at the distance of about four degrees and a quarter at eight o'clock, when she is nearly in a line with this star and the second of the Twins, and of course near the line passing through the third of the Twins and the first of Orion. The two first stars of the Twins, and the two first of the Lesser Dog cannot fail of being noticed, the former above, the latter below her, both pairs at a considerable distance to the eastward. At nine, she is forty-seven degrees thirty-four minutes from the first of the Lion. On the 4th she passes the meridian at thirty-five minutes past six, and at eight is seen near to, but to the west of the line between the second of the Twins, and the first of the Lesser Dog; and to the east of the line between the first of the Twins and the first of the Lesser Dog, but she is nearest to the first of the Lesser Dog. At nine she is thirty-four degrees forty-seven minutes and a half from the first of the Lion.

On the 5th, the Moon is on the meridian at twenty-seven minutes past seven, being directly under the two stars in the Crab, called the northern and southern Asses, between which is the remarkable nebula. She is perceived to have made a considerable approach to the first of the Lion to the east of her, and to have receded far from the two first stars of the Twins, and the Lesser Dog, now to the west of her. Under her are the small stars in the head of the Hydra, and, of course, the first or heart of the Hydra is below her to the eastward. At nine o'clock she is seventy-four degrees fifty-eight minutes from the first of the Virgin, and fifty-eight degrees forty-three minutes from Aldebaran. On the 6th, she is on the meridian at nineteen minutes past eight, having then directly under her the first of the Hydra, the small stars in its head being below her to the west of the meridian. Above her, eastward, at the distance of about nine degrees, is the first of the Lion; the eleventh and tenth, the two stars in the mouth and nose of the Lion, being above her on the meridian: all the other stars of this constellation are, of course, to the east of the meridian, though the fourteenth, the star in the right foot of the Lion, almost directly above her, is very near to the meridian, and the fifteenth, just below it, is not far distant. At nine o'clock she is sixty-one degrees ten minutes from the first of the Virgin, and seventy-two degrees twenty-nine minutes from Aldebaran.

On the 7th, the Moon is on the meridian at twelve minutes past nine, being directly under the body of the Lion, the first, or Regulus, being above her to the west of the meridian, the stars in the head being much higher up and to the west also, but the third is near to the meridian: for the second, we, of course, look to the eastward. The first of the Hydra is below her to the west of the meridian. At nine o'clock she is forty-six degrees fifty-three minutes from the first of the Virgin, and forty-five degrees eleven minutes from the second of the Twins. On the 8th, she is on the meridian at five minutes past ten, being now in the hinder feet of the Lion; having, above her to the east, the second of the Virgin, or nearest of the five stars in triangle of the Virgin, and nearly directly above her, the eighth and fourth of the Lion; of course, the second is to the east of the meridian. Directly below her is the Cup, to the east of which is the Crow, both on the Hydra. Saturn is just risen in the south-east by east, the first of the Virgin being nearly midway between him and the Moon, who, at nine o'clock, was thirty-two degrees eleven minutes from this star, and fifty-nine degrees twenty-six minutes from the second of the Twins.

On the 9th, the Moon is on the meridian at eleven o'clock, having above her the five stars in triangle of the Virgin, and below her the stars in the Crow. A line drawn, from her, through the first of the Virgin to the east of her, passes near the first of the Balance, and below Saturn, which is in the lower part of the lower region, in the south-east. The Lion is now above her, but the whole constellation is to the west of the meridian, the second star being, however, near to it. At nine o'clock she was thirty-seven degrees ten minutes, and at twelve will be thirty-nine degrees two minutes from the first of the Lion. On the 10th is full Moon at twenty-six minutes past eleven, when she is seen under, but near to the first of the Virgin, and she passes this star at fifty-one minutes past eleven. There cannot be an eclipse, because she is upwards of two degrees and a half from the eclipticK. At nine o'clock she was fifty-two degrees sixteen minutes, and at midnight will be fifty-four degrees ten minutes from the first of the Lion.

On the 11th, she is perceived at her rising to be considerably to the east of the first of the Virgin, being under the eleventh and tenth of the Virgin, and of course under Herschell. She is nearly midway between the first of the Virgin and the first of the Balance, but nearer to the latter star, as will be seen when the two stars are both to be seen. As she mounts the heavens we shall perceive, to the east of her, the first of the Balance, and then Saturn. At nine o'clock the first of the Lion is sixty-seven degrees twenty-six minutes and a half; and at midnight, sixty-nine degrees twenty minutes from her. On the 12th, she rises under Saturn, and about three degrees from him. As she mounts the heavens, we shall distinguish the two first stars of the Balance above her, and the first of the Virgin considerably to the west of her, the second of the Scorpion and Antares to the east of her. At nine, she is twenty-eight degrees thirty-three minutes from the first of the Virgin, and at midnight, thirty degrees twenty-five minutes from this star.

On the 13th the Moon passed the ecliptick early in the morning, but too far from the full to admit of an eclipse. She rises under the second of the Scorpion, having passed this star at thirty-five minutes past two in the afternoon. Antares rises soon after her, and is seen below her; Saturn above her. During the night, the Moon, Antares, the second of the Scorpion, Saturn, and the two first stars of the Balance, will form a pleasing prospect. At midnight she is forty-five degrees twelve minutes from the first of the Virgin. On the 14th, she rises near midnight, under the seventeenth of the Serpent-bearer, which star she passed at one minute past eight in the evening, and during the morning of the 15th, is seen near to the seventeenth and eighth of this constellation; both stars being to the west, and the eighth under her. Between the eighth and the Moon is the nebulous star. Saturn is now at a considerable distance from her, but the object between her and the first of the Virgin will attract attention.

On the 16th, the Moon rises in the morning, near the stars in the head of the Archer, by which she is followed. On the 17th, she rises nearly at the same time with the small stars in the head of the Archer, but is now between them and the two first stars of the Goat, though nearer to the former star. On the 18th, she rises under and near to the two first stars of the Goat, having passed the second at twelve minutes before one of this morning: as she mounts the heavens, though never getting very high, we shall perceive Jupiter rising to the east of her. On the 19th, she rises between the two first stars of the Goat and second of the Water-bearer, being nearest to the latter star; her distance from Jupiter has considerably diminished since yesterday. On the 20th, she rises under the second and first of the Water-bearer, but nearest to the first, and, of course, not far from the four small stars in the Water-pot: she is soon followed by Jupiter. On the 21st she rises before Jupiter, who soon follows her, and is seen under her, the small stars in the Water-pot being above her; but she does not reach the line drawn through the two eastern of the four stars in square. As she mounts the heavens, Venus is seen rising to the east of her, and, with the Moon and Jupiter, forms a prospect cheering to the traveller before day-break. On the 22d, the Moon rises between the lines drawn through the two western and the eastern of the four stars in square, and as she mounts the heavens will be seen between Jupiter and the two planets Mercury and Venus, but nearest to the latter planets, whom she passes on the 23d, and on the 25th is new Moon at twenty-eight minutes past seven in the evening; but there cannot be an eclipse, as she is then nearly a degree and a half from the eclipstick.

On the 27th, the Moon will be at a sufficient distance from the Sun to be seen soon after sunset, having passed the eclíptick in the morning of this day; and being now near to the Pleiades, and the line passing through the Pleiades and Aldebaran. On the 28th, she is seen above the Pleiades and Aldebaran, having above her the second of the Bull; and the line from Aldebaran to this star passes nearly through the Moon. At nine o'clock she is thirty-nine degrees thirty-two minutes from the second of the Twins. On the 29th, she is seen near to, but to the east of the sixth of the Bull, or tip of the southern horn, having passed this star at six minutes past five in the afternoon, of course we see above her the seventh and twelfth of the Twins, and she is bending her course to the thirteenth, near to these two stars. At nine o'clock she is sixty-three degrees eight minutes from the first of the Lion. On the 30th, she is seen above the thirteenth of the Twins, having passed this star at twenty-seven minutes past four this afternoon. Under her also is the third of the Twins, but she does not reach the line between the first and third of this constellation. Above her, at a considerable distance, we shall notice the two first stars of the Twins. At nine, she is fifty degrees fifty minutes from the first of the Lion.

In this month Saturn and Herschell are seen during the nights, rising late in the evening. Mars is an evening star, but too near the Sun to be visible. Mercury, Venus, and Jupiter are morning stars.

This would be an excellent month for observations on Mercury, as during the whole of it he is at a considerable distance from the Sun, but then he is very little elevated above the horizon. On the 5th, he is stationary. On the 19th, he is at his greatest elevation, when he is not a degree from Venus, and the approaches to and recesses of these planets from each other will form a pleasing sight to those who love to take the morning air of the spring. On the 25th, the two planets are, at sun-rise, a little to the east of east by south.

Venus is a morning star, and on the 1st is about twenty-two degrees from the Sun, yet, from her height at the time of sun-rise above the horizon, being little more than six degrees, she will be little noticed. Above her are the small stars in the Water-pot, and on the 5th she passes the twenty-first of the Water-bearer, this star being only thirteen minutes to the north of her. Below her is the twenty-first, and under this star the three small stars under the name of the twenty-second of this constellation. She is now nearly in the line drawn through the two western of the four stars in square, and she pursues her course through a barren region, being on the 18th in the line drawn through the two eastern of the four stars in square. During the month she passes over about twenty-seven degrees; the Moon passing her on the 23d in the morning.

Mars is invisible this month, being in opposition on the 20th, at half-past two in the afternoon. He is then directly behind the Sun, and as his motion is slow both before and after that time, during this month, the Sun's rays will prevent him from being seen by us. As he is in conjunction on the 20th, and behind the Sun, we recollect that before this day he is an evening, and after this day a morning star.

Jupiter is a morning star, embellishing with Venus the heavens towards the east-south-east, but, like her, being in the lower part of the lower region. On the 1st, he is four degrees only from

Venus, but the distance between them daily increases; and as the Sun is constantly receding from Jupiter, his morning appearance grows longer every day. On the 1st, he has above him the small stars in the Water-pot, being about nine degrees from the middle of them; and on the 16th, he passes the eleventh of the Water-bearer, this star being thirty-three minutes to the north of him. His whole course this month is through six degrees, and he does not reach the line drawn through the two eastern of the four stars in square. The Moon passes him on the 21st before noon.

Saturn is on the meridian, on the 1st, at half past two in the morning, and of course will be seen during the greater part of the night. Above him is the third of the Balance, from which star he slowly recedes, having a regressive motion this month. His whole course is through not quite two degrees, and of course we shall have, on fine nights, a good opportunity of observing with a telescope his moons, and the peculiarity of his orb. As the two stars of the Balance are to the west, and Antares to the east of him, we cannot fail of knowing where he is to be seen at any hour of the night, by consulting the table of positions. The moon passes him on the night of the 12th.

Herschell is on the meridian, on the 1st, at twenty-five minutes past one in the morning, and on the 23d, at about midnight, when he is in opposition to the Sun. Of course, the astronomer has, during this month, a very fair expectation of making every night his observations on this hitherto deemed the remotest planet of our system. He is still near to the eleventh of the Virgin, and has a very slow regressive motion, from this star moving only through a degree and a quarter this month. The Moon passes him on the night of the 11th; and as he is in opposition on the 23d, it is evident, that during the whole month he must rise nearly about the time that the Sun sets.

The apparent diameter of the Sun, on the 1st, is thirty-two minutes two seconds, and on the 25th, thirty-one minutes forty-nine seconds. The apparent diameter of the Moon first increases, then decreases, and lastly increases. On the 1st, it is twenty-nine minutes fifty-six seconds; and from this time it decreases to the 10th, being at midnight thirty-three minutes thirty-seven seconds: it now decreases to the 24th, when it is twenty-nine minutes twenty-eight seconds; and from this day it increases to the end of the month, being, at midnight of the 30th, thirty minutes and twenty-eight seconds.

For the positions of the fixed stars, the following table refers us to the positions described in the volume for the year 1806.

Pos.	1		8		16		24	
	h.	m.	h.	m.	h.	m.	h.	m.
II	6	48	6	22	5	53		
III	8	37	8	11	7	42	7	13
IV	10	58	10	32	10	3	9	34
V	0	49	0	23	11	54	11	25
VI	2	45	2	19	1	50	1	21
VII	4	45	4	19	3	50	3	21
VIII			6	24	5	55	5	26

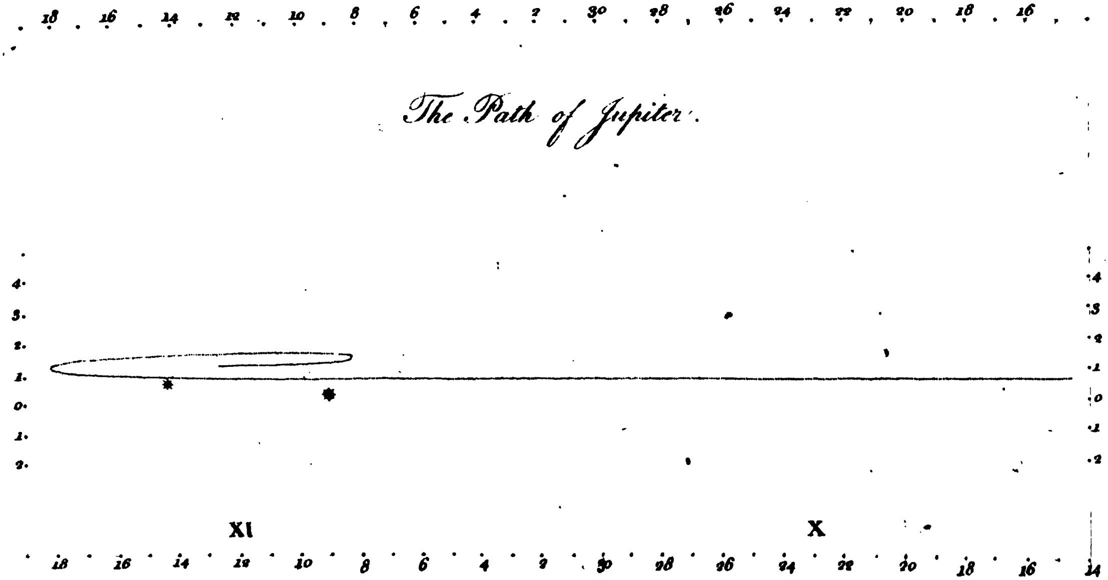
MAY, 1808.

WE have supposed, in placing the circle round the earth bead, that the Earth remained fixed, whilst the planet bead went its round, and you have probably anticipated me in some contrivance, that we may let the earth bead make its round, at the same time that we may be able to discover the place of the planet in the heavens with respect to it. What takes place on earth, may lead us to a similar contrivance for the heavenly bodies. A ship is continually changing its place, yet the compass is equally serviceable in one place as another; and our measure of the places of a planet or planets in the heavens, must be contrived so as to accompany the earth bead in its round.

This is done with great ease. We have only to make a small circle in pasteboard, the same size as that which we first made round the earth bead, and mark it exactly in the same manner. From the centre of this circle we may draw a

1808

PLATE III.



The Path of Jupiter.

very small one, from which lines may be drawn, dividing the circle into four equal parts; and the space between the circles and these lines being cut, it will be easy to fix the centre of the circle on any point we please. Through this centre we pass a needle and thread, and by it fix the earth bead to the centre; and, as before, place it in that part of the round, where the thread drawn from the centre, or the Sun passing over the earth bead, shall cut the point in the great circle representing the beginning of the first of the Ram. The thread drawn through the earth bead being brought to the same point, will also coincide with the line drawn from the Sun to that point: for if a star were in this point, it would be seen by an inhabitant of the Earth or the Sun exactly in the same line.

If we now move the thread through the earth bead to different points in the circle round it, and keep the thread strait to any distance, then, if this thread passes over any planet bead, it will point out the place in the heavens where the planet is seen at this time. We have only to look at the circle round the earth bead, and mark where the thread cuts this circle, and the number on the circle points to the degrees it is distant from the first of the Ram. Thus, if the earth bead line cuts the circle in a point whose number is 5, and the lowest Roman number near it is VII. then the planet is seven signs five degrees from the first of the Ram; that is, it is then two hundred and fifteen degrees from the first of the Ram. If the planet is two divisions from a number, thus suppose it to be two divisions from number 15, between V. and VI. then the planet is five signs seventeen degrees from the first of the Ram.

Now let us suppose, that the Earth, when seen from the Sun, is not in the first of the Ram, but some distance from it, we will say five signs fourteen degrees, or, in other words, the heliocentrical longitude of the earth is five signs fourteen degrees. To fix the earth bead in this position, we draw the line from the Sun to the point in the greater circle, marking V. 10, and then counting four divisions from figure 10, we fix our thread in that position. We now take up the pasteboard with the earth bead upon it, and bring it to the line from the Sun to the great circle, and fix it so, that this line shall pass directly over the earth bead. But it is necessary now to pay attention to the circle round the earth bead, which can be of no use to us, unless it is properly placed. We have observed, that the stars, whether seen from the Sun or the Earth, will appear to be exactly in the same straight line, and, though the earth bead is not now in the line between the Sun and the first of the Ram, yet a star in the first of the Ram is at such a distance from both Earth and Sun, that the lines from each to the star will be parallel, or it is impossible to find the difference between the two lines drawn from the Earth and Sun to the star and two parallel lines. Hence, to fix our circle round the earth bead, we place it in such a manner, that the line drawn from the earth bead to the first of the Ram in the circle round it, shall be parallel to the line drawn from the Sun to the point in the circle around it, representing the beginning of the first degree of the Ram.

But how are we to know when these two lines are parallel? This is not difficult to do almost with the eye. But to do it more completely, take with your compasses the nearest distance between the centre of the earth bead and the line drawn from the Sun to the first of the Ram, and placing one leg of your compasses successively in different places on the line from the Sun to the first of the Ram, let the point of the other leg fall upon the line between the earth bead and the first of the Ram in its circle. A few trials will make this very easy, and thus the shortest intervals between these two lines, if they were produced to the fixed stars, would be every where the same: but such is their distance, that it would be of no consequence on which of these lines a telescope was placed, as the star would appear equally the same, whether an observer looked through the telescope on the earth bead line or the sun line.

We are now prepared to measure the distances, and point out the appearances of any imaginary planet, that we may suppose to move about the Sun. As for example, let the planet bead be four times the distance of the earth bead, from the imaginary sun, and let the earth bead be moved over eight degrees in its round, whilst the planet bead is moved over one degree in its round. Then, when the earth bead is moved over one quarter of its round, the planet bead is moved over eleven degrees and a quarter in its round; and as we supposed them both to set off rom those points in their orbits, where a line drawn from the Sun over them cuts the beginning of the first of the Ram, the planet bead will be eleven degrees and a quarter in the first sign, and the Earth will have passed over three signs: that is, the heliocentrick longitude of the planet will be eleven degrees and a quarter; and the heliocentrick longitude of the Earth will be three signs. If we now draw a line from the earth bead to the planet bead, the point in the earth bead circle cut by the line, will point out the geocentrical longitude of the planet, and this longitude I leave you to consider.

We may now amuse ourselves with finding out the geocentrical longitude of our imaginary planet, when it is in conjunction, and also when in opposition. We may observe how, in the progress of the motions of the earth bead and planet bead, the geocentrical longitude increases or decreases, and sometimes appears to be fixed: and we may measure the space which the planet appears from the Earth to describe, between its appearing to be fixed at one time, and then being fixed again. Thus we shall see the nature of the motions of an Earth and planet round the Sun, upon the plan we have laid down; whether any planet in the heavens moves in this manner, we shall inquire hereafter; but all, that are at greater distances from the Sun than the Earth is, will move in a manner similar to what we have described: they, which are at the greatest distance, will, in the course of a year, have less differences in their geocentrical longitudes in that year; and they which are at the least distance, will have the greatest differences. But this subject will lead us to farther inquiries, and the appearances in the heavens for this month call for our attention.

On the 1st, the Moon is seen under the two first stars of the Twins, being at eight o'clock nearly in the line between the fourth of this constellation and the first of the lesser Dog, about five degrees from the fourth of the Twins. She is directing her course to the first of the Crab, and at nine o'clock is thirty-eight degrees nineteen minutes from the first of the Lion. On the 2d, she is nearly midway, at eight o'clock, in the line between the second of the Twins and the small stars in the head of the Hydra, having above her the two small stars, the third and fourth of the Crab, with the nebulous star between them. At nine, she is twenty-five degrees thirty-eight minutes from the first of the Lion.

On the 3d, she is on the meridian at seventeen minutes past six, having passed the two stars, called the first of the Crab, soon after noon: of course, if her superior splendour would permit it, they would be seen under, but near her. Above her, at some distance, to the east, is the first of the Lion, and, of course, higher up, the stars in the head of the Lion. At nine o'clock, she is sixty-five degrees forty-one minutes from the first of the Virgin.

On the 4th, the Moon is on the meridian at seven minutes past seven, and at their first appearance she will be perceived to have passed the line drawn through the third and first of the Lion. At nine o'clock she is about five degrees and a half from the first of the Lion; below her is the first of the Hydra. The first of the Virgin is fifty-two degrees from her eastward, and the second of the Twins forty degrees seventeen minutes from her westward. On the 5th, she is on the meridian at fifty-eight minutes past seven; and at nine, we may perceive what progress she has made under the body of the Lion, being now at nearly equal distances from the first and second of the Lion. The first of the Virgin is now thirty-seven degrees fifty-seven minutes from her eastward, and the second of the Twins fifty-three degrees fifty minutes westward. On the 6th, she is on the meridian at fifty minutes past eight, having directly above her the second of the Virgin, and above that star the second of the Lion. The five stars in triangle of the Virgin are, of course, to the east of the meridian, as is the first of the Virgin, at a considerable distance. Below the Moon are the stars in the Cup and the Crow, the Cup being to the west and the Crow, to the east of the meridian. At nine, the first of the Virgin is twenty-three degrees and a half from her eastward, and the first of the Lion thirty degrees fifty-five minutes westward.

On the 7th, the Moon is on the meridian at forty-four minutes past nine, being now under the five stars in triangle of the Virgin, the third of the Virgin being directly above her, above which are the fourth and the fifth, each a little to the east of the meridian, the seventh and the second forming with the third the westerly side of the triangle, are to the west of the meridian. To the east of the Moon is the first of the Virgin, to which she is evidently bending her course; and below her are the stars in the Crow, to the west of the meridian. At nine, she was forty-five degrees and a half from the first of the Lion. On the 8th, the Moon is on the meridian at forty-one minutes past ten, when the first of the Virgin is perceived to be to the west of her, as she passed near this star at forty-six minutes past ten this morning. She is now evidently bending her course to the first of the Balance, beyond which star we observe Saturn; and the heavens are farther enriched by the stars in the Scorpion, still more to the east, Antares being near to the horizon. Above the Moon, rather to the east of the meridian, are the tenth and eleventh of the Virgin, the tenth being the highest; these two stars being distinguished this year by Herschell moving so near to them, and at this time he is near to the eleventh, but nearer to the meridian than that star. The superior splendour of the Moon may prevent us from discovering him. At nine, the Moon was sixty degrees twenty-nine minutes from the first of the Lion.

On the 9th, the Moon is on the meridian at forty minutes past eleven, having very near to her, but to the west, the first of the Balance, which star she passed at thirty-one minutes past eight this evening. Above her, but to the east of the meridian, is the second of the Balance, below which star we shall notice Saturn; and the group, composed this evening of the two stars in the Balance, the Moon, and the stars in the Scorpion, will attract attention. The first of the Virgin is at a distance westward. As at this time the Moon is only thirty-seven minutes twenty-four seconds south of the Sun's path, we are to look out for an eclipse; certain however that there cannot be one on this day: but, as the Moon is full on the morning of the 10th, at thirty-nine minutes past seven in the morning, we must observe her progress on that day.

On the 10th, at noon, the Moon is four minutes twenty-six seconds in her upright, north of the Sun's path. At midnight of the preceding day she was thirty-seven minutes twenty-four seconds from the Sun's path, of course, there is every reason to believe, that, in the progress of the Sun and Moon, the Earth, or part of the Earth, will, some time between midnight of the 9th and noon of the 10th, be between the Sun and the Moon. The Sun, on the noon of the 9th, was eighteen degrees thirty-seven minutes forty-four seconds in the sign directly opposite to the Moon; and on the 10th, nineteen degrees thirty-five minutes thirty-six seconds; of course, the place of the Sun for every hour may be marked out on the patent paper, according to the directions given in the volume for last year, pages 137, 138, 139, 149.

The Moon, at midnight of the 9th, was seven signs fourteen degrees thirty-six minutes forty-two seconds from the vernal equinox, and on this day, at noon, is twenty-two degrees eight minutes forty-eight seconds farther; of course, we may on our patent paper mark the place of her centre for every hour. The Sun's apparent semidiameter is fifteen minutes fifty-one seconds and three tenths of a second; the Moon's apparent semidiameter is sixteen minutes forty-one seconds. We may thus round each centre make a circle, to describe the Sun and Moon, and thus tell their positions with respect to each other; and we may also notice, whether any thing more is required to determine the nature of this eclipse. The books tell us, that there will be an eclipse of the Moon, but invisible in this island, as it commences at fifty-five minutes and a half past five in the morning, and ends at twenty-six minutes past nine. At night, we shall perceive the Moon, soon after her rising, to be near to the second of the Scorpion, the star being to the east of her. She passes the eleventh of the Balance at three minutes past nine, and the second of the Scorpion at twenty-four minutes past one of the following morning. During this lunar day we perceive her therefore between the two first stars of the Balance, Saturn and Antares, or the first of the Scorpion. At nine, she is thirty-six degrees forty-one minutes from the first of the Virgin, the star being west of her.

On the 11th, the Moon rises about the same time with Antares, who is to the west of her, and as she mounts the heavens, this star, with the second of the Scorpion above it, and the Moon, form a pleasing object. Above them Saturn, and the two first stars of the Balance, add to the beauty of the scene. At nine, she is fifty-one degrees thirty-four minutes from the first of the Virgin. On the 12th, Antares, at her rising, is considerably to the west of her; and near to her, but to the west, is the eighth of the Serpent-bearer, with his neighbour, the nebulous star. She is steering her course towards the two twelfths of the Archer, and, before she sets, both of them will suffer an occultation. These occultations take place on the morning of the 13th, when the eastern rim of the Moon touches the first twelfth at ten minutes and a quarter past two, and the star emerges from the western rim at twenty-four minutes and a quarter past three. The star, on its immersion, is one minute and twenty seconds, south of the Moon's centre, and at emersion is four minutes south of the Moon's centre. As the Moon's apparent semidiameter is, during this time, nearly sixteen minutes twelve seconds, the progress of the Moon over the star may be easily delineated. The occultation of the second twelfth takes place later, the immersion being at twenty minutes and a half past three, when the star is fourteen minutes and three quarters north of the Moon's centre, and the emersion is at four, when the star is twelve minutes and a half north of the Moon's centre. The delineation of these two occultations may afford some amusement, especially as, from them, the distance between the two stars will be determined; if not accurately, yet to a degree of precision, not to be obtained by observing them, and taking their distances by a quadrant or a sextant.

On the night of the 13th, the Moon rises between eleven and twelve, and as she mounts the heavens, is perceived to have under her the small stars in the head of the Archer, the two twelfths of this constellation being now at a considerable distance. She is directing her course to the second of the Goat, but does not pass this star during the morning of the 14th. On the 15th, she rises in the morning, being soon followed by the two stars of the Goat, and her approach to the second, or lowest of these stars, will be noticed before sun-rise; but she does not pass this star till forty-four minutes past eight in the morning. On the 16th, she rises in the morning, after the two stars of the Goat, and these stars appear to the west of her, her distance from them continually increasing. To the east of her is the second of the Water-bearer, and beyond the four small stars in the Water-pot will be seen Jupiter.

On the 17th, the Moon rises under the second of the Water-bearer, the four small stars of the Water-pot rising at the same time to the east of her. As she mounts the heavens, these stars, with the first of the Water-bearer to the west of them, will be easily distinguished; and under them, but at a considerable distance, Jupiter. On the 18th, the Moon rises directly under and near to the four small stars in the Water-pot.

Jupiter rises about half an hour after, and the situation of the small stars above, and Jupiter below, the Moon, will amuse the morning traveller. On the 19th, the Moon rises under the four stars in square, having passed the line drawn through the two westerly of those stars. Jupiter is now seen to the west of her, and, as she mounts the heavens, we shall notice, before sun-rise, Jupiter near to her, and Venus at a considerable distance from her, eastward. On the 20th, the Moon rises under the four stars in square, but is observed not to have passed the line drawn through the two eastern of those stars, though she is near to that line, and will pass it soon after sun-rise. Jupiter is to the west of her, and Venus to the east, but she is nearest to Jupiter; and before sun-rise the two planets and the Moon form a prospect pleasing to the early riser. On the 21st, the Moon rises und er the four stars in square, and as she mounts the heavens, the three first stars of the Ram, with Venus under them, to the eastward, and Jupiter, under the four small stars of the Water-pot, westward of her, may attract our notice.

On the 22d, the Moon rises near to the three stars of the Ram, which are to the east of her, and is soon followed by Venus. On the 23d, the three stars of the Ram above, and Venus below, the Moon, may attract notice; and on the 24th, these objects will be seen to the west of her; and as she approaches the Sun, we must now examine what will take place at the new Moon on the 25th, at forty-one minutes before noon. At this time, the distance of the Moon in the upright is one degree nine minutes and one quarter south of the earth's path, yet there is an eclipse, but it is not to be perceived in this island, and the accounting for this circumstance may amuse the reader.

On the 27th, the Moon, at her first appearance, will be seen under the seventh, twelfth, and thirteenth of the Twins; the latter star she passes at six minutes past ten; of course we shall notice near to her the third of the Twins, distinguishable by being brighter than any of the other three stars. At nine o'clock she is fifty-three degrees forty-four minutes from the first of the Lion. On the 28th, she is above the preceding stars, and under the two first stars of the Twins, being in a pleasing position between the third and the two first of the Twins, and the two first of the Lesser Dog. Orion is below her, the greater part under the horison. At nine, she is forty-one degrees thirteen minutes from the first of the Lion. On the 29th, she is perceived to have passed the line between the two first of the Twins and the two first of the Lesser Dog, and her course is evidently directed towards the two first of the Crab. At nine she is twenty-eight degrees thirty-five minutes from the first of the Lion. On the 30th, she is perceived, at her first appearance, to be at the east of the two first stars of the Crab, having passed the first at forty-eight minutes past five, and the second first at forty-six minutes past six. Under her, therefore, we shall distinguish the small stars in the head of the Hydra, and above her the first star of the Lion, and the whole of that fine constellation. At nine o'clock, she is sixty-eight degrees fifty-three minutes from the first of the Virgin. On the 31st, she is under the first of the Lion, but has not yet arrived to the line passing nearly through this star and the third above it, and the first of the Hydra below it; she is directing her course to the first of the Virgin, from which star, at nine o'clock, she is distant fifty-five degrees thirty-three minutes.

Mercury is a morning star the greater part of this month, his superior conjunction taking place on the 27th, at a quarter past nine. At the end of the month he will, therefore, be totally lost in the Sun's rays, and in the early part he will not be much noticed, except by peculiar observers, as his height above the horizon in the east at sun-rise is small. In his conjunction he is half a degree in his upright from the Sun's path, and about a quarter of a degree from the Sun's rim. The Moon passes him on the morning of the 25th.

Venus is a morning star, but near the horizon even at sun-rise on the 1st of the month; but this height is increasing every morning. She passes twenty-eight degrees with a direct motion, being on the 1st under the fifth and sixth of the fishes, two small stars; and on the 8th, near to the fifteenth of this constellation, a small star, from which she is distant only three minutes. Above her, to the east, are the three first stars of the Ram, under which she rises on the 13th, and is seen under them for several successive mornings; and she ends her course, rising at a considerable distance from the three stars of the

Ram, to the west of her, and near to the Pleiades, to the east of her. On the 1st, Mercury is not a degree and a half from her, and this distance daily increases; but it is a sufficient inducement for the early riser to fix his attention on the east before sun-rise. The Moon passes her on the 23d.

Jupiter is on the meridian at a quarter past eight of the morning of the 1st, and of course is a morning star. We have thus the three planets, Jupiter, Venus, and Mercury, morning stars, Jupiter being most to the westward, and at sun-rise at a considerable distance from the Sun and height above the horizon. Every day increases this distance and height, and though Mercury is lost very early, Jupiter and Venus will adorn the eastern hemisphere. Jupiter passes through four degrees and a half with a direct motion, being, on the 1st, a little to the west of the line drawn through the two western of the four stars in square, the four small stars in the Water-pot being above him to the west; and on the 19th, he is close to the twenty-first of the Water-bearer, from which star he proceeds slowly with a direct motion and in a barren region. The Moon passes him on the night of the 18th.

Mars is a morning star, but too near the Sun for us to observe him till towards the end of the month. At sun-rise, therefore, on the 1st, are four planets in the eastern hemisphere, and in the following order: Jupiter, Venus, Mercury, Mars; Jupiter being the most western, and Mars very near to the Sun. Mercury is, on the 22d, between Mars and the Sun. The keen astronomers will have a view of all these objects; but the general observer will content himself if he is gratified with sufficient opportunities of seeing the two first. The Moon passes Mars on the night of the 24th.

Saturn passes over the meridian at half an hour before one in the morning of the 1st, and at fifty-four minutes past ten of the night of the 25th. He is in opposition to the Sun on the 9th, at a quarter past eight in the evening, and, of course, this month is very favourable to observations upon him. His motion is retrograde through two degrees and a quarter, being, on the 1st, nearly in the line between the third and thirteenth of the Balance, but nearest to the third, every day, however, making slow advances to the thirteenth. The two first stars of the Balance to the west, and the two first stars of the Scorpion to the east of him, are sufficient guides to his situation, as his light exceeds that of these stars, though it is of a dull cast. The Moon passes him on the morning of the 10th.

Herschell passes the meridian at twenty-seven minutes past eleven of the 1st, and at six minutes past ten of the 21st. His motion is retrograde through one degree ten minutes, moving slowly from the eleventh of the Virgin to the east of him, till he comes to a point nearly at equal distances from the eleventh and from the tenth, which, when on the meridian, is directly above him. The Moon passes him on the morning of the 9th.

The Sun's apparent diameter, on the 1st, is thirty-one minutes forty-seven seconds, and on the 25th, thirty-one minutes thirty-seven seconds. The Moon's apparent diameter first increases then decreases, and finally increases. On the 1st, it is thirty minutes thirty-eight seconds;

on the 9th, thirty-three minutes twenty-six seconds; on the 21st, twenty-nine minutes thirty-two seconds; and on the 31st, thirty-one minutes forty seconds.

The appearances of the fixed stars for every hour of the night of this month, may be discovered by consulting the following table, and reading the description of the position in the volume for the year 1806, to which you are directed for the hour by the table.

Pos.	1		8		16		24	
	h.	m.	h.	m.	h.	m.	h.	m.
IV.	9	7	8	40				
V.	10	58	10	31	10	0	9	28
VI.	0	54	0	27	11	56	11	24
VII.	2	54	2	27	1	56	1	24
VIII	4	59	4	32	4	1	3	29
					6	4	5	32

JUNE, 1808.

WE may represent upon a pasteboard the motions of the planets and Earth around the Sun, and this scheme will answer in some respects; yet there are defects, which have probably already suggested themselves to you. Before we remedy them, it may be useful and amusing to try some little easy things, which may make the subject familiar to us. The distance of a planet from the Earth seems to be a thing not easily to be measured. How can we get at it? many people will say; and when we talk of millions of miles, as easily as they do of feet, they can scarcely form any conception of the means which we have of ascertaining any so great a distance. However, this is not a very difficult point, and the little scheme we have formed will shew us, that distances are not an insurmountable obstacle to an astronomer.

Let us place the earth bead at the distance of an inch from the point representing the Sun, and suppose that he moves round our imaginary sun in a circle, whose radius is an inch: let us now make circles also round the Sun, whose rays shall be an inch and a quarter, an inch and a half, and so on, the interval between two neighbouring circles being a quarter of an inch. Whether any planet moves in any of these circles, or between which of two adjacent circles, we may discover, if we have their places given. Thus, on the 1st of this month, the Sun appears to us to be in the point two signs ten degrees and three quarters from the beginning of the first of the Ram. We must, therefore, fix our earth bead with the circle around it, in such a place in its orbit, that the line drawn from the earth bead to the Sun, shall cut the circle by the point marked II. 10, and three quarters of a degree from the point 10. Mars is on this day one sign twenty-four degrees from the first of the Ram, that is, the thread drawn from the Sun to the planet bead, will cut the circle by the point after I. marked 20, and four degrees from this point. Keep the thread from the Sun fixed to this point. If the Sun did not prevent Mars from being seen, he would appear to a spectator on the earth on this day, in two signs and three quarters of a degree from the first of the Ram. We draw then from the earth bead the thread near the point II. and three quarters of a degree from it, and keep the thread stretched till it cuts the thread from the Sun, and where the two threads cut each other, there is the planet Mars; and by shewing at what distance he is from the nearest circle, we may tell his distance from the Sun, and also his distance from the Earth, on this day, for he is as many quarters of the Earth's distance from the Sun farther from the Sun as there are circles between him and the earth bead circle; and whatever part his distance from the circle nearest to him, but the farthest of the circles between him and the Earth, is of a quarter of an inch, so much of a quarter of the Earth's distance from the Sun is he still farther removed from it.

On the 25th, the Sun's geocentrical longitude is III. 3° 39′, and the geocentrical longitude of Mars is II. 17° 31′, and the heliocentrical longitude of Mars is II. 6° 49′. From our imaginary sun, therefore, we draw the thread to the point in its circle, II. 6° 49′, and keep it there fixed. We fix the earth bead with the circle around it, so that the line, drawn from the earth bead to the Sun, shall cut the circle round the earth bead in the point III. 3° 39′: and then we draw the thread from the earth bead over the point in its circle II. 17° 31′, till it cuts the thread drawn from the Sun, and where the two threads cut each other is the place of Mars. If the distance of Mars from the Sun is not now very nearly what it was before, it shews that our beads have not been placed so properly as they should be.

On these days the longitudes of Jupiter were as follow: namely, on the 1st, the heliocentrical longitude is XI. 4° 20, and his geocentrical longitude XI. 16°. From the Sun, therefore, we draw our thread to the point XI. 4° 20′, and keep it fixed; and from the Earth, fixed as before for this day, we draw the thread over the point XI. 16°, till it cuts the thread from the Sun, and where the two threads cut each other, we fix a point for Jupiter. The distance of this point, measured as we did for Mars, shews the distance of Jupiter from the Sun; and by measuring the thread between the earth bead and Jupiter, we know the distance of Jupiter from the Earth on this day.

On the 25th, the heliocentrical longitude of Jupiter is XI. 6° 29′, his geocentrical longitude is XI. 17° 47′. The earth bead being placed in the situation already described for this day, we draw from the Sun the thread to the point XI. 6° 29′ in the circle around it; and from the earth bead the thread over the point XI. 17° 47′ till it cuts the Sun's thread, and where the two threads meet, is Jupiter's place on this day, and his distance from the Sun is determined as before.

We may do the same for Saturn and for Herschell on these days, though our pasteboard may not be large enough for these planets, and in this case, the table will do as well, provided that the pasteboard is kept flat upon it. The heliocentrical longitude of Saturn is, on the 1st, VII. 19° 41′, and his geocentrical longitude VII. 17° 21′. We draw our threads, therefore, from the Sun to the point in its circle, marking the heliocentrical longitude of Saturn, and from the earth bead, the thread over its circle on the point, marking his geocentrical longitude; and where these two threads meet we fix a bead for the planet Saturn, and measure his distance from the Sun as before. On the 25th, his heliocentrical longitude is VII. twenty degrees twenty-five minutes, and his geocentrical longitude is VII. sixteen degrees four minutes: we find his place, therefore, according to the preceding directions, and measure his distance from the Sun and Earth by means of the sun thread and earth thread.

The heliocentrical longitude of Herschell, on the 1st, is, VII. three degrees twenty-nine minutes, and on the 25th, VII. three degrees forty-four minutes; and his geocentrical longitude, on the 1st, is, VII. one degree thirty-minutes, and on the 25th, VII. one degree three minutes; of course his place will be very little changed in the interval between these days, and we may measure his distances from the Sun and Earth in the same manner as we have done that of the other planets. In this case, however, our threads will be much longer than before; and we may form some notion of the immense distance of Herschell from us. How much this falls short of the distance of some of the fixed stars time will hereafter discover, for it is not improbable, that it will be known to a future generation; a generation, which shall take equal delight in all the works that adorn and improve humanity, as the present does in war, tumult, and bloodshed, and those arts which are a disgrace to our nature. But, as we can enjoy the future triumphs of man only from a complete knowledge and conviction of scriptural truth, and the infidelity of persons, professing to be christians, is notorious in this respect, we will now go to our accustomed task, and point out various appearances in the heavens, which may amuse our evening walks.

The Moon is seen, on the 1st, under the Lion, being between Regulus or the first star in this constellation, and the small stars in the Cup, but nearest to Regulus. Above her is the second of the Lion, at a considerable distance. At nine, she is forty-one degrees fifty-five minutes from the first of the Virgin, nearly upon the meridian. On the 2d, she is between the second of the Lion and the small stars in the Cup, the latter stars being nearest to her. Above her, within the distance of six degrees, is the second of the Virgin, the nearest to her of the five stars in triangle; and at nine, she is twenty-eight degrees from the first of the Virgin. On the 3d, she is between the five stars in triangle and the stars in the Crow, directing her course to the first of the Virgin, to the east of which star we discover the two first of the Balance, and Saturn; and, farther eastward, Antares, distant from her, at nine, fifty-nine degrees twenty-seven minutes. On the 4th, the first of the Virgin is near to her at her first appearance, but to the west of her, as the Moon passed this star at forty-minutes past seven. She is directing her course to the first of the Balance. The tenth and eleventh of the Virgin, with Herschell, are to the east of, and above her. At nine, she is forty-five degrees four minutes from Antares, to the east of her, and fifty-four degrees fifty-three minutes from the first of the Lion, to the west of her.

On the 5th, the Moon is on the meridian at twenty-two minutes past nine, the tenth and eleventh of the Virgin being almost directly above her; the eleventh being within two degrees of her. To the west of and above her is Herschell, at the distance of about five degrees. We shall now note the first of the Virgin to the west of her, and to the east, the two first stars of the Balance and Saturn, below which are the stars in the Scorpion, the Moon being, at nine, thirty degrees thirty-four minutes from Antares. On the 6th, she is on the meridian at twenty-one minutes past ten, the first of the Balance being now to the west of her, as she passed this star at twenty-two minutes past six in the morning. The second of the Balance is almost directly above her, and Saturn much nearer to her, but above her to the west. To the east of her are the stars in the Scorpion, and in this position the objects around her cannot fail of striking our attention. At nine, she is seventy degrees thirty-seven minutes from the first of the Eagle, to the east, and thirty degrees nineteen minutes from the first of the Virgin, to the west of her. On this day she passed the Sun's path, but as she is two days from the full, there cannot be an eclipse.

On the 7th, the Moon is on the meridian at twenty-one minutes past eleven, when Antares is almost directly below her; and the second of the Scorpion to the west of her, and nearly at the same distance. She passed this latter star at a quarter before noon. From their first appearance, therefore, we shall distinguish near her the two first stars of the Scorpion; and to the west of her the two first stars of the Balance, and Saturn; and still farther, westward, the first of the Virgin, as, at nine, she is forty-five degrees nine minutes from this star, being at the same time fifty-seven degrees twenty-seven minutes from the first of the Eagle.

On the 8th is full Moon, at thirty-four minutes past three in the afternoon, but no eclipse, as at this time she is upwards of two degrees in her upright, north of the Sun's path. During the night, we shall notice, to the west of her, the two first stars of the Scorpion, now at a considerable distance; and farther still, the two first of the Balance, and Saturn; and still farther, the first of the Virgin, at the distance of fifty-nine degrees fifty-one minutes, at nine.

On the 9th, the Moon, at her rising, is to the east of the two twelfths of the Archer, having passed the first twelfth at four minutes, and the second twelfth at thirty-nine minutes past one in the afternoon. Under her, rise the small stars in the head of the Archer; and, during the night, we shall perceive, that her course is directed, above them, to the second of the Goat. At nine, she is twenty-nine degrees nineteen minutes from Antares.

On the 10th, the Moon rises between the small stars in the head of the Archer, and the two first stars of the Goat; and as she mounts the heavens, the latter stars will be perceived to the east of her. At midnight, she is forty-four degrees fifty-two minutes from Antares. On the 11th, she rises under the two first stars of the Goat, having passed the second of this constellation at three minutes past six in the afternoon; of course, these stars will be perceived, during the night, to be near to, and to the westward of her. At midnight she is fifty-eight degrees twenty-one minutes from Antares. On the 12th, she rises under the second of the Water-bearer, this star being near to, and to the east of her; the two first stars of the Goat being now at a considerable distance to the west of her. As she mounts the heavens during the morning of the 13th, we may perceive, to the east of her, the first of the Water-bearer, and the four small stars of the Water-pot, and under them, at some distance, Jupiter. When she rises at night, the small stars in the Water-pot are just risen to the east of her, and above her is the first of the Water-bearer. Jupiter rises soon after her, and during the morning of the 14th, as she mounts the heavens, these objects may amuse the traveller. On the 14th, she rises near midnight, and under the small stars in the Water-pot, now to the west of her, being followed very soon by Jupiter; and the approach of the Moon to the planet may be noticed during the morning of the 15th. On the 16th, in the morning, soon after her rising, we notice, to the west of her, Jupiter, and the smaller stars in the Water-pot, and above her, the four stars in square. She has passed the line drawn through the two western of these stars.

On the 17th, she rises in the morning under the four stars in square, but to the east of the line drawn through the two eastern of these stars. Jupiter is now considerably to the west of her; and as she mounts the heavens, we notice the three stars of the Ram to the east of her. On the 18th, at her rising in the morning, we perceive the three stars of the Ram to the east of her just risen; and on the 19th, she rises under these stars, who are to the west of her. On the 20th, she rises nearly at the same time with the Pleiades to the east of her, the three stars of the Ram being above her considerably. On this day, she passes the sun's path, but, for an evident reason, without producing an eclipse. On the 21st, she rises nearly under the Pleiades; and on the 24th, is new Moon at four minutes before one in the morning, there being no eclipse, as the Moon is then upwards of three degrees in her upright from the Sun's path.

The Moon appears again in the evening of the 25th, and soon after sun-set is perceived to be directly under Mercury; the two first stars of the Twins are to the north of them; and in our evening walk, if the evening is fine, we shall not fail to remark these objects in the west-north-west. On the 26th, the Moon is near to the two first stars of the Crab; Mercury, and the two first stars of the Twins being to the north of her, and the objects on each side of the west-north-west will, in our evening walks, claim our attention. On the 27th, her distance from Mercury will be perceived to have increased considerably, though we shall still compare together her light with his, before he disappears; and above her we shall note the first star of the Lion; and, as the stars in that constellation appear (of which not many will, from the brightness of the night), we may observe, that all are above her. At nine o'clock, she is fifty-eight degrees thirty-two minutes from the first of the Virgin. On the 28th, she is nearly midway between Mercury and the first of the Virgin, but nearest to the planet; the first of the Lion is now to the west of her, and above her; at a considerable distance, is the second of this constellation. At nine, she is forty-four degrees fifty-seven minutes from the first of the Virgin. On the 29th, she is seen, at their first appearance under the five stars in triangle of the Virgin, being almost in a line with the second of the Lion and the small stars in the Cup. Considerably to the west of her is the first of the Lion, and above her the second of that constellation. At nine, she is thirty-one degrees eleven minutes from the first of the Virgin. On the 30th, she is far advanced under the five stars in triangle of the Virgin, having directly almost above her, the seventh and the third; the seventh being the nearest to her, the second is to the west of her, and she is now nearly in a line with the second of the Lion and the small stars in the Crow. The first of the Virgin is considerably to the east of her; and at nine, she is sixty-two degrees fifty-five minutes from Antares or the first of the Scorpion. Above the line, between the Moon and this star, we shall first notice the first of the Virgin; and farther eastward, the two first stars of the Balance, and Saturn.

Mercury is an evening star during this month; and from the middle to the latter end of the month, will frequently excite our attention soon after sun-set. He moves through about fifty degrees in the course of the month, being, on the 1st, between the horns of the Bull, but too near to the Sun to be visible; then passing through the constellation of the Twins, and ending his course in the Crab, very near to the southern Ass, but not having reached that star. The keen astronomers will make their observations upon him very early in the month. On the 10th, the general observer will notice him near the horizon, about north-west-by-west, at forty minutes after sun-set. Above him are the two first stars of the Twins; each succeeding night we shall have better opportunities of viewing him, as the interval between his setting and sun-set increases. On the 11th, if the night is fine and clear, we shall note with pleasure, his passage by the fifth of the Twins, as he passes this star at the distance of only two minutes; the star being to the north of him. On the 16th, we shall perceive that he has approached much nearer to the two first stars of the Twins, which are above him; and just below him is the fourth of that constellation. On the 25th, he is in a line drawn through the two first stars of the Twins; and from their appearance to their setting, the two stars and the planet will form a very beautiful object. His recess from this line will be noted every succeeding night; but from the first time that we discover him, after sun-set, to the end of the month, we shall be pleased with the appearance of the evening star, as he will be called by most people, who make no distinction between this planet and either Venus or Jupiter, when they are in similar situations. The Moon passes him on the morning of the 26th.

Venus is a morning star. She has a motion during the month of about twenty-seven degrees, and on the 1st, rises soon after the Pleiades, and under them. The Sun rises about forty minutes after her, and the interval between her rising and sun-rise is continually diminishing. The Moon passes her on the morning of the 23d.

Mars is a morning star, being, in the early part of the month, between Venus and the Sun, but in the latter, Venus is between the Sun and him. They are both too near the Sun for the general observer to notice their approaches to and recesses from each other. As Venus is approaching to the Sun, Mars is receding from him; of course, every day, from the first time that we discover Mars before sun-rise, will present him sooner to our view. They pass each other on the 14th, Mars being to the north, and Venus to the south, of the equator. On the 25th, he will be far enough from the Sun to be seen before sun-rise, the second of the Bull, or star in the tip of the northern horn, being above and near to him. The Moon passes him on the evening of the 22d.

Jupiter is a morning star during this month, being on the meridian on the 1st, at nearly half past six in the morning, and on the 25th, at fifty-eight minutes past four in the morning; he rises, therefore, each succeeding day, earlier; and on the seventh, at half past three in the afternoon, he is ninety degrees from the Sun, or in quadrature with him. His motion is through only about two degrees, having passed the line drawn through the two eastern of the four stars in square; the small stars in the Water-pot being to the west of him. Early risers cannot fail of distinguishing these objects in the south-east. The Moon passes him on the morning of the 15th.

Saturn is on the meridian at twenty minutes past ten at night, of the 1st, and forty minutes past eight in the evening of the 25th; of course, during the whole of this month, he is in a favourable position for observations. His motion is only through a degree and a half, and it is retrograde, or from west to east. The two small stars, nearest to him westward, in the beginning of the month, are the small stars called the first and second thirteenths, and east of him are the small stars called the sixth of the Balance. The star above them, the third, is distinguished by superior brightness, and the two first stars of the Balance; the first near to him, when he is on the meridian, to the west; and the second, above him to the east of the meridian, cannot fail of being distinguished by us. The first of the Virgin, to the west, and Antares to the east of the meridian, will make, with Saturn and the stars in the Balance, the southern heavens an object of attention in our evening walks. The Moon passes Saturn on the evening of the 6th.

Herschell is still near the tenth and eleventh of the Virgin, having a slow motion from the latter star of only a little more than half a degree. He is on the meridian, on the 1st, at twenty minutes past nine, and on the 21st, at about forty minutes past seven. He is nearly midway between the first of the Virgin and the first of the Balance, which stars at these times will be seen, the former to the west, and the latter to the east of the meridian. The Moon passes him on the afternoon of the 5th.

The Sun's apparent diameter, on the 1st, is thirty-one minutes thirty-five seconds; and on the 25th, thirty-one minutes thirty-one seconds. The Moon's apparent diameter first increases, then decreases, and finally increases. On the 1st, it is, at midnight, thirty-two minutes; and it increases to the 6th, when it is thirty-three minutes four seconds: it then decreases to the 18th, when it is twenty-nine minutes thirty-six seconds; from this time it increases to the end of the month, when it is thirty-two minutes sixteen seconds. At midnight of the 21st, it is exactly half a degree.

The appearances of the fixed stars for this month will be discovered by consulting the following table of positions, and referring to the description of them in the volume for the year 1806.

Pos.	1		8		15		23	
	h.	m.	h.	m.	h.	m.	h.	m.
V.	8	55	8	26	7	57		
VI.	10	51	10	22	9	53	9	20
VII.	0	51	0	22	11	53	11	20
VIII.	2	56	2	27	1	58	1	25
IX.	4	59	4	30	4	1	3	28
X.			6	25	5	56	5	23

JULY, 1808.

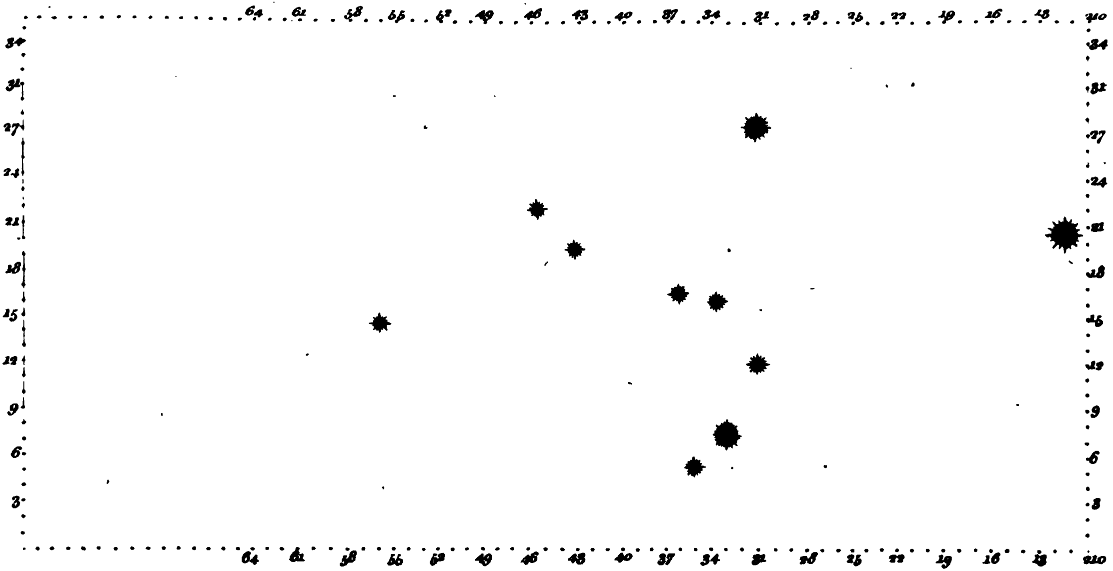
IF the Earth and planets moved round the Sun like balls on a flat table, our device to represent their motions would succeed in a great measure; and, if they moved in circles, and we knew the distance of each from the Sun, we should with great success discover the distances of all the planets by means of their longitudes. But man may attempt to imitate nature, and he will produce very extraordinary and pleasing works; yet his inferiority will soon be detected, and every work of nature is far above his highest achievements. The first thing, that baffles us in all our endeavours, is the distance of the Earth from the Sun; then the length of a year; lastly, the shape of his round, which is indeed very much like to a circle, but more like to another kind of figure of a peculiar make.

The figure is called an ellipse, and you may form a notion of it, by scraping a little the bottom of a loaf of sugar. The sugar loaf is made in the form of a cone, and the bottom of it is circular. If we scrape the bottom a little, so that the loaf should stand sloping instead of being upright, then the shape of the bottom is no longer circular; the edge is not a circle, but a figure which is called the ellipse. The more we scrape the bottom of the loaf, provided we do it evenly, and the loaf shall stand sloping upon its base, the more the figure of the bottom of the loaf varies from that of a circle, and we have oblong ellipses of various descriptions. The figures of the planets are said to be ellipses, and they resemble very much the figure at the base of a sugar-loaf, when it is very little sloped: but, when I say that the Earth moves in an ellipse, I would by no means be kept to the strict letter; for many reasons induce me to believe, that neither the Earth nor any of the planets move in figures of that name and form. It is sufficient, however, for our purpose, that these bodies move in figures very nearly resembling ellipses, or rather more like to an ellipse than to a circle.

As the planets move in figures much like circles, we may make circles on our pasteboard, to represent their paths. The first thing is to place our earth bead at the proper distance, and this may be at any distance, near or far from the imaginary sun, or centre of the pasteboard: but, according to the distance at which we place the earth bead from the sun, so much more or less pasteboard shall we require to represent upon it the paths of the planets. We could represent the figure of our system very nearly, without knowing the exact distance of the Earth from the Sun, provided we knew the length of a year, and also the lengths of the times in which each planet performed his round; and this is a discovery for which we are indebted to Kepler, a German, who thus led the way to the discoveries of Sir Isaac Newton, a man, who is the real honour of the English nation, and whose authority stands deservedly high in some respects, though it is slighted in others of greater importance. Sir Isaac Newton was led, from the contemplation of nature, to the God of nature: he acknowledged him in his works: he admired his wisdom in the structure of the world. He completely understood, that one Person only could be the author of this glorious system: but he did not stop here, as too many philosophers have done, whose discoveries in the material world have done eminent service to mankind: Sir Isaac Newton contemplated the material world in its true light, as subservient to the purposes of the higher beings, for which it is formed. For better knowledge, he studied the scriptures, and there the same wisdom and greatness shone out perspicuous, as had excited his awe in the material world. The same Person, to whom he looked up with reverential awe, as the great creater of the material system in which we live, he now considered as the kind parent of rational beings. The author of the material world commanded awe; the author of revelation excited love: and the God of Jesus Christ became the object of his love, and the sole object of his adoration.

From the discovery of Kepler, we find, that the planets go round the Sun in such a manner, that the times of performing their rounds bear a very peculiar proportion to their distances. Thus, according to this law, if a planet were twice as far from the Sun as the Earth, its time of going round would not be twice as great as the time of the Earth's going round, but nearer to three times that time; and, in fact, it would be two years three hundred and two days,

PLATE IV.



J. Bye sculp.

and somewhat more than half a day. It is a curious process to find this time; and it may amuse the persons expert in numbers to find it accurately. To do this, they must have the exact length of the year, which is somewhat short of three hundred and sixty-five days and a quarter. However, we may suppose, without very great error, that the year is three hundred and sixty-five days and a quarter long. The number then, 365 ¼, we must multiply into itself, and the product will be a number of considerable magnitude. We must now find a number, that, being multiplied into itself, gives a product; and this product, multiplied into the original number, must give the number we found by multiplying 365 ¼ into itself. This, which appears to be so very troublesome to find, may be shortened by Lord Neper's ingenious contrivance of logarithms in such a manner, that the whole may be done in less than three minutes, and with very few figures.

As the planet, we suppose to be twice as far from the Sun as the Earth is, goes round the Earth in a determinate time, somewhat more than two years three hundred and two days and half a day; it will move only over twenty-one minutes and between twelve and thirteen seconds,[*] whilst the Earth is moving a degree; or about seven degrees,[†] whilst the Earth is moving over twenty degrees. When the Earth has made one round, the planet will have gone through a hundred and twenty-seven degrees eighteen minutes; and at this rate of motion we shall perceive that, at the end of two years three hundred and two days and somewhat more than half a day, the planet will have made one round completely. The mode of finding the rate of a planet's motion is found much easier by a simple process of Sir Isaac Newton, which will corroborate this statement; but, to understand it, we must inquire into the nature of forces, a doctrine of some subtilty, and which may hereafter afford us amusement. For the present, we will be content with the mode pointed out, which may be tried with planet beads, three times, four times, five times the distance of the Earth from the Sun; and during this month, our evening walks will present to us objects in the heavens capable of exciting the attention of all who have read my preceding volumes.

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[*] 21′,2132.

[†] 7°,07108.

On the 1st, the Moon is on the meridian at a quarter past six, and, when the Sun permits her and the stars to be seen, we shall see her to the west, and within five degrees of the first of the Virgin, to which star she is bending her course. Below her are the stars in the Crow, and above the five stars in triangle, all to the west of her; and at nine, she is forty-eight degrees fifty-five minutes from Antares. On the 2d, she is on the meridian at eight minutes past seven, and we shall, after sun-set, perceive that she is to the east of the first of the Virgin, having passed this star at eleven minutes past two in the morning, and of course she is much farther from the star to-night, than she was at the same time last night, and the distance is constantly increasing. Above her, at nine o'clock, is Herschell, at the distance of about a degree and a quarter, and of course the tenth and eleventh of the Virgin are near, the tenth being directly above her, and the eleventh to the eastward of her. Farther eastward we notice the two first stars of the Balance, and Saturn, near to, and to the east of these stars. At this time the Moon is thirty-four degrees fifty minutes from Antares, to the east; and sixty-five degrees twelve minutes from the first of the Lion, to the west of her.

On the 3d, the Moon is on the meridian at four minutes past eight, and between nine and ten, we shall notice her between the first of the Balance and Saturn, but below them. If the night is fine, the passage of the Moon under these objects will be a pleasing sight; and the first of the Virgin to the east, and the first and second of the Scorpion to the west, will increase the interest of the scene. At nine, she is seventy-four degrees fifty-three minutes from the first of the Eagle, and twenty-five degrees thirty-three minutes from the first of the Virgin. On the 4th, the Moon is on the meridian at two minutes past nine, being near to, but to the east of the second of the Scorpion, having passed this star at eight minutes past eight. Below her, to the east of the meridian, is Antares, or the first of the Scorpion. Saturn and the two first stars of the Balance are now at a considerable distance from, and above her, to the west of the meridian; and the first of the Virgin, at nine o'clock, is thirty-nine degrees fifty-eight minutes from her. On this day, she passed the ecliptick in the morning, but, for evident reasons, without producing an eclipse.

On the 5th, the Moon is on the meridian at one minute past ten, being directly under the seventh of the Serpent-bearer, the two first stars of the Scorpion being now to the west of her; and the line from her to the first of the Virgin being distinguished by these two stars, Saturn and the two first of the Balance. She is directing her course to the two twelfths of the Archer, and, at nine, was fifty-four degrees twenty-three minutes from the first of the Virgin. On the 6th, she is on the meridian at eleven, being then very near to the second twelfth of the Archer, having passed over the first twelfth; but the brightness of the moon will prevent our perceiving the immersion and emersion. The star touched the eastern rim at thirty-nine minutes and a quarter past nine, being then a quarter of a minute north of the Moon's centre, and touched the western rim at fifty-three minutes and forty seconds past ten, being then two minutes south of her centre. When she is on the meridian, Jupiter has just risen, near the east by south, and the first of the Virgin is setting near west-south-west. About ten, we shall notice the two stars of the Goat, just risen, and the two first of the Scorpion on the meridian, the Moon being nearly midway between them: and the line, between the first of the Virgin and the

Moon, will present the same objects worthy of notice, which we mentioned last night. At nine, she is sixty-eight degrees forty-one minutes from the first of the Virgin.

On the 7th is full Moon, at three minutes after noon, when the Moon is upwards of three degrees and three quarters from the earth's path, and of course no eclipse is to be expected. In the evening, at the first appearance of the stars, we shall perceive her over the small stars in the head of the Archer, the two first stars of the Goat being at a considerable distance to the east of her; and still farther, but to the west of her, the two first stars of the Scorpion. At nine, she is thirty-seven degrees forty minutes from the first of the Scorpion. On the 8th, she rises about the same time with the two first of the Goat, who are near to, but to the east of her. During the night we may observe her approaches to the second, or the lowest of these two stars, as she passes it before sun-rise. At nine, she is fifty-one degrees twenty-one minutes from Antares.

On the 9th, the Moon rises under the two first stars of the Goat; and, as she mounts the heavens, they will be noticed to the west of her, and the second of the Water-bearer to the east of her. At nine, she is sixty-four degrees forty-five minutes from Antares. On the 10th, she rises under the first and second of the Water-bearer, the first being to the east, and the second to the west of her; and, as she mounts the heavens, we shall notice Jupiter to the east of her. On the 11th, she rises under the four small stars in the Water-bearer; and, as she mounts the heavens, we shall perceive that she has made considerable approaches towards Jupiter to the east of her; and in a line with her and the four stars in the Water-pot, is Fomalhaut, near the horizon; but for this star we need not look till she has been risen nearly three hours. On the 12th, she rises under the four stars in square, having passed the line drawn through the two western of these stars. Jupiter rises soon after, and under her. On the 13th, she rises still under the four stars in square, not having arrived at the line drawn through the two eastern of these stars, but she is in this line about midnight. Jupiter is now to the west of her and the Moon and planet will form a pleasing object to the traveller by night.

On the 14th, the Moon rises about the same time with the three stars in the Ram, which are considerably to the east of her; and she is under the four stars in square, but nearest to the third of Pegasus, the lowest of the two eastern stars; and she is nearly in a line with the third and the second, or the diagonal of the square. Jupiter is considerably to the west of her. On the 15th, she rises near to the three stars of the Ram, which are still to the east of her, the third, or least of them, being within six degrees of her at midnight. On the 16th, she rises under the three stars of the Ram; and, as she mounts the heavens, is perceived to have passed the line between the first of the Ram and the first of the Whale; the Pleiades are considerably to the east of her. On the 17th, she rises about midnight, before which time she passes the ecliptick or Sun's path, but without an eclipse, for evident reasons; the Pleiades rose nearly at the same time with her; and, as she mounts the heavens, during the morning of the 18th, they will be perceived to the east of her; and just before sun-rise, she is in the line between them and the first of the Whale. On the 19th, she rises in the morning, under the Pleiades, who are to the west of her; and, as she mounts the heavens, Aldebaran is seen under her; but she has passed the line between the Pleiades and Aldebaran, and is directing her course to the sixth of the Bull, and passes the fifth, or star just above Aldebaran, at thirty-two minutes past five in the morning. On the 20th, the Moon rises nearly at the same time with Aldebaran, having passed the line between this star and the second of the Bull; and on the 21st, she rises under the second of the Bull, and is perceived, before sun-rise, to be directing her course to the thirteenth of the Twins, under the seventh and twelfth. On the 23d is new Moon, at eighteen minutes after noon; but without an eclipse, as she is then nearly five degrees from the Sun's path.

On the 25th, we see the Moon again soon after sun-set, in the form of a very pointed crescent, and at this time making a very good object for the telescope. She is now under the Lion, the first being near and to the west of her, and about seven degrees from her. At nine, she is forty-eight degrees twenty-six minutes from the first of the Virgin. On the 26th, she is perceived to have travelled a considerable distance under the Lion since last night, being now under, but at a considerable distance from the second of the Lion, yet nearer to this star than to the first of the Lion, to the west of her. Above, but to the east of her, is the second of the Virgin, the most western of the five stars in triangle. At nine, she is thirty-four degrees twenty-eight minutes from the first of the Virgin. On the 27th, she is under the five stars in triangle of the Virgin, being under, and nearest to the seventh of this constellation, the star between the second and third: the third being the star in the vertex of the triangle, and the second the most western of the five stars. The first of the Virgin is to the east of her; and at nine, she is sixty-six degrees four minutes from Antares. In tracing the line from the Moon to this star, we shall of course notice the first of the Virgin, the two first stars of the Balance, and Saturn.

On the 28th, she is perceived to have approached considerably nearer to the first of the Virgin, which is still to the east of her, the five stars in triangle being above, and to the west of her. At nine, she is fifty-two degrees two minutes from Antares. On the 29th, the first of the Virgin is seen to the west of the Moon, as she passed the star at half past seven this morning. At nine in the evening she is almost directly under Herschell, and within four degrees of him. Above her, at a greater distance, is the tenth; and lower down, but to the east, the eleventh of the Virgin, the two stars, noted on account of the vicinity of Herschell to them. She is now thirty-eight degrees one minute from Antares; and the two stars of the Balance, with Saturn, above the line between the Moon and Antares, will excite attention.

On the 30th, as soon as the star appears, the Moon will be seen near to the first of the Balance, having passed this star at thirty-five minutes past seven. Saturn is above her, and, higher up, the second of the Balance. This group we shall notice; and the two first stars of the Scorpion, to the eastward, will increase the interest of the scene. At nine, she is seventy-seven degrees fifty-two minutes from the first of the Eagle. On the 31st, she is seen to the east of Saturn and the two first stars of the Balance, the second of the Scorpion being to the east of her, to which she is directing her course, and Antares farther eastward and below her. In her way to the second of the Scorpion, she passes over the eleventh of the Balance; the immersion of this star taking place at forty-nine minutes and three quarters past nine, when the star is eleven minutes north of the Moon's centre; and the emersion at forty-three minutes past ten, when the star is eight minutes north of the Moon's centre. In the morning of this day she passes the ecliptick or Sun's path; but, for evident reasons, without producing an eclipse. At nine, she is sixty-five degrees ten minutes from the first of the Eagle.

Mercury is an evening star to the twenty-ninth, on which day he is in his inferior conjunction at three quarters past seven in the afternoon. On the 1st, after sun-set, he will be seen by many observers; but every succeeding evening increases the difficulty. On the 1st, his position is very near the fourth of the Crab, or the southern Ass, this star being only eight minutes from him, to the north; and on the 15th he is stationary, having moved about eight degrees; from which time he moves back, but not to his former position, but to a point above the third of the Crab, or northern Ass. The Moon passes him on the morning of the 24th.

Venus is a morning star, but so near the Sun, that she will not be visible. She is in the same sign with him, and passes through it and eight degrees of the fifth sign. The Moon passes her on the morning of the 23d.

Mars is a morning star, and, on the 1st, is between the horns of the Bull, in a line with the tips, or the second and sixth of this constellation; and he has a direct motion of nearly twenty-one degrees. On the 14th, he passes the seventh of the Twins; and, on the 17th, the twelfth of the Twins. On the 24th, he is under the fifth; and, on the last day of the month, above the sixth of the Twins. In the latter part of the month, he will be distinguished in the east-north-east; but in the beginning of the month, the Sun's rays, and his nearness to the horizon, will render him unnoticed, except by careful astronomers. The Moon passes him on the morning of the 21st.

Jupiter is on the meridian, on the 1st, at half past four in the morning; and, on the 24th, at fifty-five minutes past two in the morning. He rises about eleven on the 1st, near east by south, and every evening earlier; but he will not embellish our evening walks. On the 8th, he is stationary, and, during the whole month, moves forwards and backwards little more than a degree. His position is under the four stars in square, which, when he is on the meridian, are seen, the two western on the western side, and the two eastern on the eastern side, both pair at nearly equal distances from the meridian. Above him, to the west of the meridian, is the third of the Fishes. The Moon passes him on the night of the 12th.

Saturn is on the meridian on the 1st, at fourteen minutes past eight after noon, and will form a feature in our evening walks. He is now above, and near to the two thirteenths of the Balance, the first of this constellation being near him to the west, and the second above him to the east of the meridian. He is stationary on the 20th; and, on the 25th, is on the meridian at thirty-six minutes past six after noon. During the whole month he does not move through half a degree backwards and forwards. The Moon passes him on the morning of the 31st.

Herschell is on the meridian at fourteen minutes past seven after noon of the 1st, and at fifty-three minutes past five after noon on the 21st. This month is therefore still very favourable to observations upon him; and he is sta-

-tionary on the 9th, not moving, on the whole, backwards and forwards, through a quarter of a degree. Above him, when on the meridian, but to the east of it, is the tenth of the Virgin; and below him, but more easterly, the eleventh. The first of the Virgin is at some distance to the west of him. The Moon passes him about nine in the evening of the 2d, and again soon after midnight of the 29th.

The Sun's apparent diameter, on the 1st, is thirty-one minutes thirty-one seconds; and, on the 25th, thirty-one minutes thirty-three seconds. The Moon's apparent diameter first increases, then decreases, then increases, and finally decreases. On the 1st, it is thirty-two minutes twenty-two seconds, and it increases to the 3d, when it is at midnight thirty-two minutes thirty-eight seconds: at this magnitude it continues nearly to the noon of next day, from which time it decreases to the 16th, when it is twenty-nine minutes thirty-eight seconds. It now increases to the 29th, at midnight, when it is thirty-two minutes twenty-four seconds; and it decreases to the 31st, finishing with a magnitude of thirty-two minutes eighteen seconds.

The positions of the stars for any hour of the night, will be discovered by consulting the following table, and referring to the volume for 1806, where each position is explained under the number in the left hand column.

Pos.	1		8		16		25	
	h.	m.	h.	m.	h.	m.	h.	m.
VI	8	47	8	18	7	46	7	10
VII	10	47	10	18	9	46	9	10
VIII	0	52	0	23	11	51	11	15
IX	2	55	2	26	1	54	1	18
X	4	50	4	21	3	49	3	13
XI			6	22	5	50	5	14

AUGUST, 1808.

WE have supposed, in our scheme with pasteboard and planet beads, that the earth and planets move round the Sun, as it were upon one flat; that the Sun is the centre of an immense plane; and that in this plane, all the planets and Earth are moving. But this is not the case in nature: the Sun, Earth, and planets are not at present in the same plane; perhaps they have never been all in the same plane since their original creation, if they were so at that time, and perhaps they will never be again in the same plane. If we suppose a plane to be drawn through the Earth and Sun, then some of the planets are above and others are below this plane. In this month, Mercury is, at the beginning below, and at the end, above the plane; Venus, Mars, Saturn, and Herschell are above the plane; Jupiter is below the plane.

To represent this with our pasteboard, we should suppose, as before, the Sun to be in the centre, and the earth-bead at its proper distance: and then, with pins, at proper distances, we might represent the planets. We should, as before, fix them according to their heliocentric longitudes, and, running the pin through the pasteboard, let the head of it be of a proper height, to correspond with the height of a planet above the plane of the circle round about the Sun: thus, in this month, the heads of the pins representing Venus, Mars, Saturn, Herschell, would be above the pasteboard; and Jupiter, being below the plane of the eclipitck or Sun's apparent path, the head of the pin representing him will be downwards; in this case it will be below the pasteboard, and the point of the pin being above it, will shew where the planet is.

But this is an inconvenient mode: we cannot see at the same time the heads of the pins representing the planets; and we wish to have them before us at the same time. Our pasteboard will still be of use to us with a very easy device: cut a few pieces of cork to be of the same thickness, and as ladies use needles whose heads are broken, instead of pins, for fine work, we may borrow an artifice from them. To make a head to their needle, they melt some sealing wax, and putting the needle into it, make a small ball for a head of whatever size they please. For our planets, we may thus make balls of different sizes, and the needle may be inserted into the cork to any depth, suited to its length. The needle on which our imaginary sun is placed, and the needle with the earth-ball at its top, being of the same length, and inserted into the cork to the same depth, the Earth and Sun will always be at the same height above the pasteboard. For the other planets we take longer or shorter needles, as the case requires. For example, for this month, our needles with balls on their heads, which are to represent Venus, Mars, Saturn, and Herschell, are to be longer than the earth or sun needles, so that each planet may be higher above the cork than the earth or sun is each above his cork. The balls representing Jupiter and sometimes Mercury are to be on needles smaller than the sun or earth needles, so that they may be not so high above the cork as either the earth or sun is each above his cork. Hence we look upon our pasteboard---the balls representing Venus, Mars, Saturn, and Herschell will be above the plane, parallel to the pasteboard, which passes through the Earth and Sun; and the other balls will be below this plane.

As the planets move round the Sun, they are constantly changing their situation with respect to this plane, so that our needle must be, on every change of place, drawn out or pushed into the cork, and, at times, the ball will be at the same distance from its cork, as the earth-ball is from its cork. When this is the case, when the balls representing the Sun, Earth, and planets are each at the same distance from their corks, then they evidently are in the same plane. If the planet needle requires to be drawn a little out of the cork, then the planet is rising above the plane: if it requires to be sunk a little into the cork, then it is sinking below this plane.

A planet, in going round the Sun, is twice in this plane: of course, the length of the needle between our planet-ball and its cork will be twice of the same length as the distance of the earth-ball above its cork. Now, as it is twice only in this situation, it must come to it either by the length of the needle between the planet-ball and the cork, growing shorter and shorter, or growing longer and longer. If it is growing shorter and shorter before it comes to the same length, as the earth ball above its cork, then it is said to be descending: if this length is growing longer and longer, before it comes to the same length as the earth-ball above its cork, then it is said to be ascending. The two points, where the length of the needle between the planet-ball and its cork is the same as that between the earth-ball and its cork, are called nodes: and thus, every planet has two nodes: the one is called the ascending node; the other, the descending node.

If, when the planet is in either node, the line drawn from it to the Sun should pass through the Earth, then, if it is an inferior planet, that planet would appear to an inhabitant of the earth to be passing over the Sun's disc, or the planet would pass behind the Sun, and be invisible to us on the earth. To the inhabitants of the Sun, the Earth and planet, in this case, would appear to be either in the same or opposite points of the heavens. If the planet is a superior planet, and is in its node, then, if the line drawn from it through the Sun passes through the Earth, then the planet will appear to us to be either in opposition, or the planet will pass directly behind the Sun. The inhabitant of the Sun will, in this case, see the planet and Earth in the same or opposite point of the heavens.

The adjustments of the corks, the needles, and balls, may afford no small amusement: the balls may be made of various sizes, according to the magnitudes of the planets they are to represent. Whilst you are considering the situation of the imaginary planets on pasteboard, the observations, that we have to make this month in the heavens, will facilitate your acquaintance with this part of our subject, and we will pursue, as usual, their real track through the heavens.

On the 1st, the Moon is on the meridian at fifty minutes past seven, Antares being below her to the west of the meridian, and the second of the Scorpion about the same height with her, but to the west also of the meridian. At nine, she is fifty degrees twenty-two minutes from the first of the Virgin; and midway, above the line, between her and this star, we notice the two first stars of the Balance and Saturn. On the

2d, she is on the meridian at forty-eight minutes past eight, the two stars called the twelfth of the Archer, being above her to the east of the meridian; and farther eastward, the small stars in the head of the Archer. Jupiter is just rising near east by south; and between him and the Moon we distinguish the two first stars of the Goat, the two first of the Water-bearer, and the four small stars in his Water-pot. To the west of the meridian we draw a line to the first of the Virgin (distant, at nine, sixty-four degrees twenty-one minutes), and near this line we notice the two first stars of the Scorpion, the two first of the Balance, and Saturn.

On the 3d, the Moon is on the meridian at three quarters past nine, having under her, but to the east, the small stars in the head of the Archer, the two twelfths being now to the west of her, as she passed them both between five and seven in the morning. To the east of her, in the lower part of the lower region, near east by south, is Jupiter; and lower down, near south-west by west, is Saturn. The line drawn from the Moon to each of these planets, will present to us the objects that we noticed last night. At nine, she is thirty-three degrees eleven minutes from Antares, and seventy-one degrees twenty-two minutes from the first of Pegasus. On the 4th, she is on the meridian at forty minutes past ten, the two first stars of the Goat being above her to the east, and the small stars in the head of the Archer, below her, to the west of the meridian. Saturn is now setting, but Jupiter is above the middle of the lower region, considerably to the east of her. At nine, she is fifty-eight degrees seventeen minutes from the first of Pegasus, and forty-six degrees forty minutes from Antares.

On the 5th, the Moon is on the meridian at thirty-three minutes past eleven, having above her, the fifth and twelfth of the Water-bearer; and, to the west of the meridian, the two first stars of the Goat, the second or lowest of which stars she passed at noon. Jupiter will be noticed to the east of her, now in the upper part of the lower region, and directly above her, at some distance, on the meridian, are the four small stars of the Dolphin. At nine, she is forty-five degrees thirty-six minutes from the first of Pegasus, and sixty degrees from Antares. On the 6th, is full Moon, at five minutes past ten in the morning, but without an eclipse, as the Moon is now upwards of four degrees and three quarters from the eclíptick or Sun's path. She rises under the second of the Water-bearer, which is to the east of her; and as she mounts the heavens, we perceive, farther to the east of her, Jupiter; the four small stars in the Water-pot will be eclipsed by her splendour. At nine, she is thirty-three degrees thirty-five minutes from the first of Pegasus, and seventy-three degrees seven minutes from Antares.

On the 7th, the Moon rises under the first of the Water-bearer, the second being to the west of her. As she mounts the heavens, we shall perceive under her, Fomalhaut, or the first of the southern Fish, and her approach to Jupiter will claim our notice. At nine, she is eighty-five degrees fifty-eight minutes from Antares. On the 8th, she rises under the four small stars in the Water-pot, being in the line drawn through the two western of the four stars in square. Soon after her, Jupiter rises, and as she mounts the heavens, is seen below him. On the 9th, she rises under the four stars in square, but she has not reached the line drawn through the two eastern of these stars. Jupiter is now to the west of her, and rises soon after her, and will, with her, as they mount the heavens, form an interesting object. At nine, she is sixty-one degrees from the first of the Eagle, near the meridian. On the 10th, she rises under the four stars in square, having passed the line drawn through the two eastern of these stars. Jupiter is considerably to the west of her, and the three first stars of the Ram to the east of her. This night she passes between us and the fourth of the Fishes, this star touching her eastern rim at thirteen minutes past eleven, being two minutes and a half north of the Moon's centre; and it emerges from the western rim at twenty-two minutes and a half past midnight, being then two minutes north of her centre. At nine, she is seventy-one degrees fifty-two minutes from the first of the Eagle. On the 11th, she rises soon after the three first stars of the Ram, these stars being to the east of her.

On the 12th, the Moon rises under the three first stars of the Ram, but she does not reach, during the night, the line between the first of the Ram and the first of the Whale. On the 13th, she passes over the ecliptick, or Sun's apparent path, but evidently without producing an eclipse. She rises nearly at the same time with the Pleiades, who are to the north of her; and, as she mounts the heavens, she is perceived to be nearly in the middle of the triangle, at whose points are the three first stars of the Ram, the Pleiades, and the first of the Whale. On the 14th, she rises below the Pleiades, who are near to her; but, as she mounts the heavens, she is perceived not to have passed the line between the Pleiades and the first of the Whale. On the 15th, she rises before midnight, and a little above Aldebaran, having passed the fifth of the Bull between one and two in the afternoon; and during the morning of the 16th, we observe her receding from Aldebaran, and directing her course to the sixth of the Bull.

On the 17th, the Moon rises in the morning under the sixth of the Bull, having passed this star at one minute past ten at night of the 16th, and she is directing her course to the thirteenth of the Twins, whom she passes at three minutes past nine in the morning. As she mounts the heavens, we shall notice Mars to the east of her. On the 18th, she rises in the morning under the thirteenth of the Twins, and is soon followed by the third of this constellation, which is seen below her. As she mounts the heavens, we notice, to the east of her, Mars, and above him the two first stars of the Twins. On the 19th, she rises soon after the two first stars of the Twins, and is followed very soon after by Mars, who is to the north of her, and she passes him in the day-time. On the 20th, she rises under Mars; and, on the 21st, at ten minutes past ten at night, is new Moon, but without an eclipse, as the Moon is between four and five degrees from the eclиptick, or apparent Sun's path.

On the 23d, the crescent of the Moon will be again seen, and under the second of the Virgin, directing her course to the first of the Virgin, to the east of her. On the 24th, she is seen under the five stars in triangle of the Virgin, but to the eastern side of it, the first of the Virgin being still to the east of her. On the 25th, the first of the Virgin is to the west of her, as she passed this star at forty-two minutes past one after noon. She is bending her course to the first of the Balance, which, with Saturn, is to the east of her. At nine, she is forty-one degrees thirty-four minutes from Antares. On the 26th, she is near to, but to the west of the first of the Balance, Saturn being to the east of that star; and thus the Moon, the star, and the planet will form a pleasing object during the night. At nine, she is eighty degrees forty-seven minutes from the first of the Eagle. On the 27th, she passes the ecliptick or apparent Sun's path, in the morning; but, being far in her first quarter, without producing an eclipse. She passed the first of the Balance early in the morning; and, in the evening, both Saturn and this star are seen to the west of her: and the Moon being thus between the two first stars of the Balance, with Saturn, and the two first of the Scorpion, will excite us to mark these objects. At nine, she is sixty-seven degrees fifty-four minutes from the first of the Eagle.

On the 28th, the Moon is seen to the east of the second of the Scorpion, having passed this star at fifty-two minutes past seven in the morning. Antares, or the first of this constellation, is below her, and Saturn, with the two first of the Balance, considerably to the west of her. At nine, she is fifty-five degrees twenty-eight minutes from the first of the Eagle. On the 29th, she is on the meridian at forty-nine minutes past six, and when the stars are visible, will be seen nearly midway between the first of the Scorpion and the two twelfths of the Archer, to which latter star she is bending her course. On the 30th, she is on the meridian at three quarters past seven, the two twelfths of the Archer being to the west of her, as she passed these stars about noon. At nine, she is twenty-nine degrees fifty-one minutes from Antares. On the 31st, she is on the meridian at forty minutes past eight, the two first stars of the Goat being above, and to the east of her, Jupiter and Saturn being at very considerable distances from her, the former to the east, and in the upper part, the latter to the west, and in the lower part of the lower region. At nine, she is sixty-one degrees forty-three minutes from the first of Pegasus.

Mercury is a morning star during this month, but too near the Sun to be visible in the beginning of the month; towards the middle he will attract attention; as, on the 13th, he is nearly fifteen degrees high at sun-rise; and on the 16th, he is at his greatest elongation. The middle of the month is well calculated for observations upon him. On the 9th, he is stationary. The Moon passes him on the 20th.

Venus is an evening star, but too near the

Sun to be visible, its superior conjunction taking place on the 3d, at two in the morning.

Mars is a morning star, having a progressive motion of twenty degrees, being, on the 1st, near the sixth of the Twins. On the 6th, he passes the fourth of this constellation, the star being fifty-eight minutes and a half south of him. On the 20th, he is in a line with the two first of the Twins above him, and he concludes his course at a point about three degrees from the nebula, between the northern and southern Asses in the Crab. The Moon passes him on the 19th.

Jupiter is on the meridian at half past two in the morning of the 1st, and at a quarter past one in the morning of the 19th; his motion is retrograde through three degrees and a half. When he is on the meridian, on the 1st, we shall perceive above him the four stars in square, the two western being on the western, and the two eastern on the eastern side of the meridian; but every night he advances towards the line drawn through the two western stars, and at the end of the month, will be in that line which, being produced, passes nearly through Fomalhaut, which, when Jupiter is on the meridian, is also near to it, but on the western side, and about eight degrees above the horizon. On the 25th, he passes the twenty-first of the Water-bearer, the star being only twenty-six minutes to the north of him. This star is in the stream from the Water-pot; and on its eastern boundary under him, are the small stars, the twenty-second, and the three under the name of the twenty-third. The Moon passes him near midnight of the 8th.

Saturn is on the meridian at nine minutes past six afternoon of the 1st, and at forty-two minutes past four of the 25th; of course we shall have frequent opportunities of seeing him in the western hemisphere; his motion is progressive, and he travels through nearly two degrees and a half this month, being on the 1st, nearly in a line with the first and third of the Balance, but nearest to the first, and moving nearly in that line, and ending his course nearest to the third. Above him we notice the second of the Balance, and the varying triangle of the two stars, the first and second of the Balance and Saturn, will make his motion perceptible. The Moon passes him on the morn of the 27th.

Herschell is on the meridian at ten minutes past five in the afternoon of the 1st, and fifty-seven minutes past three of the afternoon of the 21st. We, of course, see him below Saturn, and have frequent opportunities of making our observations on him with a glass. His motion is progressive through one degree; he is at first under and nearest to the tenth of the Virgin, but finishes, by being nearest to the eleventh of this constellation; both stars well known by drawing a line from the first of the Virgin to the first of the Balance. The Moon passes him on the morning of the 26th.

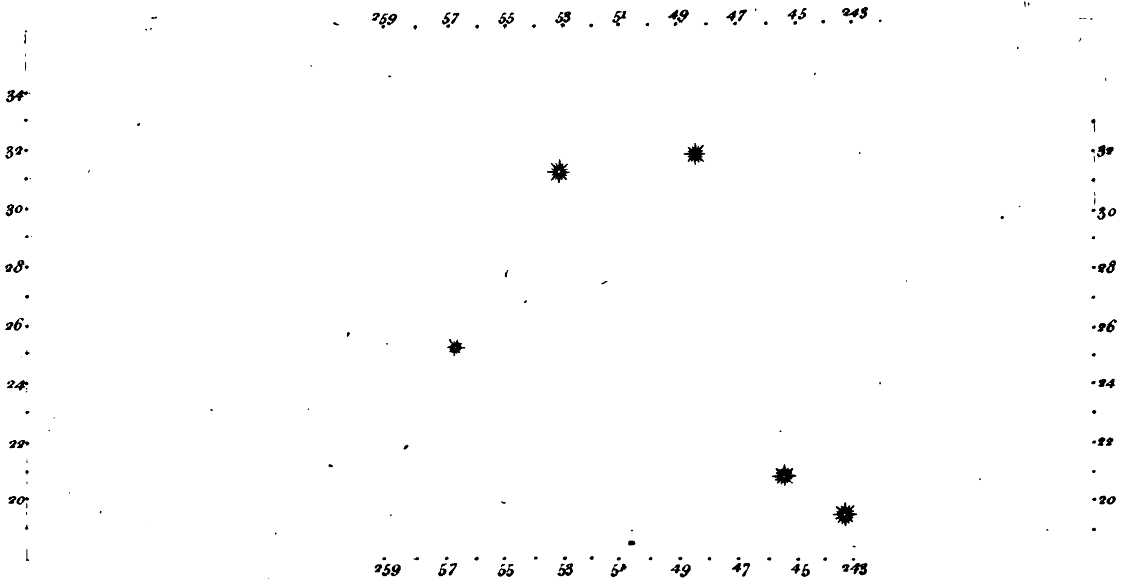
The apparent diameter of the Sun is, on the 1st, thirty-one degrees thirty-five minutes, and, on the 25th, thirty-one degress forty-three minutes. The apparent diameter of the Moon first decreases, then increases, and finally decreases. On the 1st, it is thirty-two minutes sixteen seconds; on the 12th, at midnight, it is twenty-nine minutes thirty-eight seconds; on the 24th, at midnight, it is thirty-two minutes forty-four seconds; and, on the 31st, at midnight, it is thirty-one degrees twenty-four seconds.

The appearances of the fixed stars for every hour of the night will be known by consulting the volume for 1806, and reading the description of each position referred to in the following table.

Pos.	1		8		16		25	
	h.	m.	h.	m.	h.	m.	h.	m.
VII.	8	42	8	15	7	45	7	12
VIII.	10	47	10	20	9	50	9	17
IX.	0	50	0	23	11	53	11	20
X.	2	45	2	18	1	48	1	15
XI.	4	46	4	19	3	49	3	16
XII.					5	55	5	22

PLATE V.

page 174.



J. Bye sculp

SEPTEMBER, 1808.

THE planets, we know from repeated observation, do not continue one direct course; and, by means of our pasteboard, we perceive that, if two bodies are moving round a third, which is fixed, they must appear to each other to move at one time in one direction, and at another in the opposite direction. The Moon, however, differs in this respect from the planets: for she continues a direct course according to the order of the signs, and from this she never deviates. We cannot upon our pasteboard place a moon-ball to represent the motion of the Moon, so that its distance from the earth-ball should bear anything like the true proportion; for the Moon is so near to the Earth in comparison with any of the planets, that, if we made the distance of the moon-ball only one quarter of an inch from the Earth, we could get no pasteboard sufficiently large to contain the circle of the earth's ball round the Sun, and of course we could not get any to contain the circles for the balls representing the higher planets.

But, though we cannot place a moon-ball at its proper distance from the Earth, we may suppose a moon-ball to move in the circle round the earth-ball, and we may place it there according to its situation in the heavens for any one night, and thence mark the relative situations of the Moon and planets for any one night. But, as the motion of the Moon round the Earth is of a very particular nature, it may perhaps be better to amuse ourselves with considering its motion by itself, that is, without reference to any other planets, and supposing that there were in existence only a Sun and Moon and Earth and fixed stars.

We fix then, as before, a point in the pasteboard for the Sun, and around it draw a circle to represent the Earth's path, in which the earth's bead is to be moved. This bead we attach to a smaller piece of pasteboard, whose rim is a circle, marked with the twelve signs, and divided into five degrees. The circle representing the Earth's path is also divided in the same manner. In the circle round the Earth, we place the Moon at the beginning of the first sign, and the Earth also, in its circle, at the beginning of the first sign, and of course the thread drawn from the Sun to the beginning of the first sign, and produced, will pass over both earth and moon bead; that is, to an inhabitant of the Sun the Earth and Moon will be in the same place in the heavens; the inhabitant of the Moon will say, that there is an eclipse of the Sun, the Earth taking away his light; and the inhabitant of the Earth will say, there is an eclipse of the Moon, and it is the time of a full Moon.

We will suppose now, that the Earth went round the Sun in twelve months of thirty days each, and the Moon round the Earth in thirty days; of course the Earth moves through one sign in a month, the Moon appears to the inhabitant of the Earth to move through all the signs. But how will the Moon appear to move to an inhabitant of the Sun? This will be easily seen by placing the Earth with its circle successively in every five degrees of the first sign, and, at the same time, the Moon in the circle round the Earth in every successive sixty degrees. This will shew us, that the Moon will appear to the inhabitant of the Sun to move forwards and backwards; and also, that, at the end of the month, the Moon will appear to the inhabitant of the Sun to have moved through less than thirty degrees.

In the next month we shall find, that at the end of the month the thread drawn from the Sun to the Earth, and produced, will not pass over the Moon, and that the latter falls short of the heliocentric longitude which the Earth has. We may continue this process till we find that at the end of some one month the heliocentric longitude of our Moon is greater than that of the Earth; and that it continues to be greater every month, till at last the thread from the Sun passes over the earth and moon beads exactly in the same place where it did at first, namely, where we placed them at the beginning of the first sign.

In this case the inhabitant of the Moon would have no great difficulty in determining the length of his year; for, finding the same occurrence continually repeated of the Sun, Earth, and Moon being in the same straight line, he would measure his year as we do, by the Sun appearing to describe a path in the heavens, and returning to the same situation. This path would, however, be traced over in a different manner from what the Sun appears to mark out to us, and must occasion some singular appearances. By whatever way, however, he marks out his year, he would find that all his years were equal, and the same as the year we supposed the Earth to have of three hundred and sixty days.

But now let us suppose, that as before, the Earth moved round in three hundred and sixty days, but the Moon moved round the Earth in twenty-eight days; when the Earth has made its round, the Moon will not be found in the place where it was when they both set off together: and this mode of determining the length of a year will be wanting. If, however, the inhabitant of the Moon determined the length of the year by the Sun appearing to him to be in the same place in the heavens, where he was when the Earth and Moon set off together, it will be a curious thing to find out how long his year will be, and whether his years will be of the same length. Whilst you are thinking on this subject, and trying it with the threads from the sun and earth balls, or settling the points by numbers, a few days, probably, will elapse; but we need not, on this account, lose our observations in the heavens, and we will examine what is the path traced out by our real Moon during this month.

On the 1st, the Moon is on the meridian at thirty-two minutes past nine, the two first stars of the Goat being near to her, but to the west of the meridian, as she passed the second at fifty-two minutes past six this afternoon, and at nine she is forty-nine degrees nine minutes from the first of Pegasus to the east of her, and fifty-six degrees twelve minutes from Antares, who is to the west of her, and near to the horizon. On the 2d, she is on the meridian at twenty-two minutes past ten, the second of the Water-bearer being above her to the east of the meridian, and the two first stars of the Goat now at some distance to the west of the meridian. Beyond the second of the Water-bearer we notice, now to the east, the first of the four small stars of the Water-pot, and below them Jupiter. At nine she is thirty-seven degrees seven minutes from the first of Pegasus. On the 3d, she is on the meridian at ten minutes past eleven, having directly above her the first of the Water-bearer, and of course to the eastward the four small stars of the Water-pot. Under and near to her is the eighth of the Water-bearer, Jupiter being now just above the lower region farther to the east. At nine, she was sixty-five degrees fifty-seven minutes from the first of the Ram.

On the 4th is full Moon, at forty-one minutes past ten at night, but without an eclipse, as she is upwards of four degrees from the Sun's apparent path. She rises under the four small stars in the Water-pot and above Jupiter. During the night, the planet thus under the Moon will attract attention: she passes him in the morning of the 5th, but scarcely reaches the line drawn through the two western of the four stars in square before sun-rise. On the evening of the 5th, she rises under the four stars in square, and soon after her rising we perceive Jupiter to the west of her. As she mounts the heavens we perceive that she is midway between the lines drawn through the two western and the two eastern of the four stars in square. At nine she is fifty-seven degrees thirty-two minutes from the first of the Eagle. On the 6th, she rises under the four stars in square, having now passed the line drawn through the two eastern of these stars, but being very near to that line. As she mounts the heavens, we notice above her these stars and the three first stars of the Ram to the east of her, Jupiter being much nearer and to the west of her. At nine, she is sixty-eight degrees twenty-three minutes from the first of the Eagle. On the 7th, she rises under the four stars in square, but beyond the line passing through the second and third of Pegasus, that is, the highest and lowest of these stars. The three stars of the Ram rise about the same time; but Jupiter is risen, from whom she has now increased her distanc every considerably. At nine, she is seventy-nine degrees seventeen minutes from the first of the Eagle.

On the 8th, she rises very soon after the three first stars of the Ram, and at midnight is seen under and about six degrees from the third.

At nine, she is ninety degrees eight minutes from the first of the Eagle. On the 9th, she rises under the three first stars of the Ram; and, as she mounts the heavens, is perceived to have passed the line between the first of the Ram and the first of the Whale, being in the triangle formed by these two stars and the Pleiades, and nearly at an equal distance from each of these objects.

At nine, she is fifty-three degrees twenty-six minutes from the first of Pegasus. On the 10th, she passes the ecliptic in the morning, but, for obvious reasons, without producing an eclipse. At night she rises soon after the Pleiades, passing soon after the line between these stars and the first of the Whale: she is directing her course to the fifth of the Bull above Aldebaran; and at nine, is sixty-four degrees and two thirds from the first of Pegasus. On the 11th, she rises above Aldebaran, and covering the fifth of the Bull, as the emersion of that star from her western limb takes place at thirty two minutes past nine, the star being eight minutes and a half north of the Moon's centre. She is directing her course to the sixth of the Bull, and as she mounts the heavens Orion is seen in great splendour following her.

On the 12th, the Moon rises with the second of the Bull, and, as she mounts the heavens, the sixth is seen below her, which she approaches, but does not pass before sun-rise. On the 13th, she rises under the sixth of the Bull, having passed this star at thirty-one minutes past six in the morning. She is soon followed by the third of the Twins, and is seen during the night above the line drawn between this star and the sixth of the Bull, directing her course, under the seventh and twelfth of the Twins, to the thirteenth of this constellation. On the 14th, she rises under the thirteenth of the Twins, having passed this star at fifty-eight minutes past five in the morning; and is seen during the morning of the 15th, on mounting the heavens, near the line between the second and third of this constellation. On the 16th, she rises in the morning under the two first stars of the Twins, and approaching to the line drawn through these two stars, and produced. On the 17th, she rises under and near to the two first stars called the first of the Crab, having passed the first at two minutes before one, and the second first at six minutes before two of this morning: Mars has just risen; and as they mount the heavens we shall perceive him between her and the stars in the head of the Lion. On the 18th, she rises under Mars, and nearly at the same time with the first of the Lion, and these objects will fix the attention of the traveller during moonlight. On the 20th is new Moon, at twenty-seven minutes past seven in the morning, but without producing an eclipse, as the star is upwards of three degrees from the ecliptic.

On the 22d, the Moon reappears in the form of a beautiful crescent, shewing, if the evening is fair, the dark side, made apparent by the rays reflected upon it from our Earth. She is seen under Herschell and the tenth and eleventh of the Virgin, being almost in a line with, and midway between, the first of the Virgin and the first of the Balance, Saturn being nearly in this line produced. On the 23d, she passes the ecliptic in the morning, but, for obvious reasons, without producing an eclipse. She is seen in the evening to the east of the first of the Balance, having passed this star at forty minutes past eight in the morning, and is under Saturn at seven o'clock in the evening, distant only about a degree and a half. At nine, she is seventy-one degrees thirty-four minutes from the first of the Eagle. On the 24th, having moved with great rapidity since last night, she is seen to the east of the second of the Scorpion, having passed this star at twenty-eight minutes past two of the afternoon. Antares is, of course, below her; and we may judge of the swiftness of her motion by the distance she has run from Saturn since last night. At nine, she is fifty-eight degrees thirty-seven minutes from the first of the Eagle.

On the 25th, the Moon passes over the seventeenth of the Serpent-bearer at thirty-three minutes past eight in the evening, the star being three minutes and three quarters south of the Moon's centre; and she is directing her course to the two twelfths of the Archer, the two first of the Scorpion being now considerably to the west of her. At nine, she is ninety-one degrees three minutes from the first of Pegasus. On the 26th, she passes over the second twelfth of the Archer, that star emerging from her western limb at twenty-eight minutes and a half past six in the evening, the small stars in the head of the Archer are of course near, but to the east of her; and at nine, she is seventy-seven degrees thirty-nine minutes from the first of Pegasus. On the 27th, she is on the meridian at forty-six minutes past six in the evening, the small stars in the head of the Archer being below her, and to the west of the meridian; and the two first stars of the Goat above her, to the east of the meridian. At nine, she is sixty-four degrees thirty-eight minutes from the first of Pegasus.

On the 28th, the Moon is on the meridian at thirty-nine minutes past seven, the two first of the Goat being above her, to the east of the meridian, the second or lowest of these stars being about two degrees and a half from her. She does not pass the line drawn through these stars till just after her setting, but her progress to this line, and approach to the second, will be very apparent during the night. At nine, she is fifty-two degrees two minutes from the first of Pegasus. On the 29th, she is on the meridian at twenty-nine minutes past eight, the fifth and twelfth of the Water-bearer being above her a little to the west of the meridian; below her, also to the west, are the two first stars of the Goat, and above her, to the east, is the second of the Water-bearer; Jupiter is to the east of her, and Fomalhaut near and to the south-south-east of the horizon. At nine, she is thirty-nine degrees fifty-seven minutes from the first of Pegasus. On the 30th, she is on the meridian at sixteen minutes past nine, the first of the Water-bearer being above her, to the east, and the second above her, to the west of the meridian. Jupiter to the east, below the four small stars in the Water-pot, and Fomalhaut near south by east, in the lower region, will attract attention. At nine, she is sixty-nine degrees twelve minutes from the first of the Ram.

Mercury is a morning star, till the 11th, when, at six in the morning, he comes to his superior conjunction; and, though an evening star after this time, he sets so soon after the Sun, that he will be visible only to very keen astronomers.

Venus is an evening star, but too near the Sun and the horizon at his setting to be visible. At the end of the month she sets just over the first of the Virgin.

Mars is a morning star, and at sun-rise, on the 1st, is just above the lower region, to the south of east; he is, on this day, to the west of the two stars in the Crab, the third and fourth, called the northern and southern Asses, between which is the remarkable nebula. On the 5th, he passes through the nebula, and moves through the barren region of the Crab with a direct motion towards the first of the Lion, but he does not reach the star this month, falling short of him about six degrees, and having moved in the whole month through about nineteen degrees.

Jupiter is on the meridian, on the 1st, at about forty minutes before one in the morning; and we shall see him, at night, rising in the dusk of the evening; as he mounts the heavens we shall perceive that he has passed the line drawn through the two western of the four stars in square, and which, produced to the horizon, points out to us Fomalhaut; and, when Jupiter is on the meridian, these three stars are all nearly upon it. His motion is regressive through about three degrees and three quarters, so that he repasses the line drawn through the two western of the four stars in square, and produced, and ends his course about a degree from the eleventh of the Water-bearer: above him we notice the four small stars in tho Water-pot. On the 5th, he is in opposition to the Sun at three quarters past eight in the evening; and on the 25th, is on the meridian at forty-one minutes past ten at night. The whole month is very favourable for observations on him with a telescope, and with one which is capable of pointing out to us his moons, we shall be gratified by observing their changes. On the 6th, the 19th, the 23d, and the 29th, at ten o'clock at night, we may take down their positions on the patent paper, supposing the diameter of the planet to be the length of one of the sides of the square, and thence comparing the distances of the moons from his centre; having done this a few minutes, we shall easily make ourselves acquainted with their motions. The Moon passes him on the evening of the 2d.

Saturn is on the meridian, on the 1st, at twenty-three minutes past four in the afternoon, and, in the dusk, near the middle of the lower region, towards the south-west, the two first stars of the Balance being to the west of him. His motion is direct through two degrees and a half, being, on the 1st, to the east of the two thirteenths of the Balance, and at the end of the month rather beyond midway between these stars and the three sixths of this constellation, which are under the third. As he is on the meridian, on the 25th, at three o'clock in the afternoon, he sets every evening sooner and sooner, so that our opportunities of seeing him to advantage through a telescope are daily declining. The Moon passes him on the evening of the 23d.

Herschell is on the meridian at eighteen minutes past three in the afternoon of the 1st, and will be seen after dusk in the lower part of the lower region, near south-west by west. On the 21st, he is on the meridian at ten minutes past two in the afternoon, and will be too near the horizon, after dusk, to be observed; his motion is direct through a degree and a half, moving towards the eleventh of the Virgin, and, by preceding directions, he will be easily discovered. The Moon passes him on the morning of the 22d.

The apparent diameter of the Sun, on the 1st, is thirty-one minutes forty-seven seconds, and on the 25th, is thirty-one minutes fifty-nine seconds. The apparent diameter of the Moon, on the 1st, is thirty-one minutes seventeen seconds, from which time it decreases to midnight of the 9th, when it is twenty-nine minutes thirty-four seconds; it then increases to the 21st, when it is thirty-three minutes ten seconds; and it closes, at the end of the month, with thirty minutes and a half. At midnight of the 12th it is exactly half a degree.

The positions of the stars for every hour of the night, during this month, will be known by consulting the following table, and reading the description of the position referred to in the volume for 1806.

Pos.	1		8		16		25	
	h.	m.	h.	m.	h.	m.	h.	m.
VII.	6	46	6	21	5	52		
VIII	8	51	8	26	7	57	7	28
IX.	10	54	10	29	10	0	9	31
X.	0	49	0	24	11	55	11	26
XI.	2	50	2	25	1	56	1	27
XII.	4	56	4	31	4	2	3	33
I.	6	46	6	21	5	52	5	23

OCTOBER, 1808.

IN this month, last year, a comet engaged the attention of great part of Europe; most of my readers probably have seen it, and several marked its course, as it appeared to the naked eye. In this case the patent paper would be found singularly useful; at first, the greater objects were sufficient to make its place known: as, for example, Arcturus, the second star of the Balance, the first of Hercules, the first of the Serpent-bearer, and the first of the Gem; the comet could easily be distinguished between these limits, and the early observers noted it, when somewhat above the line between Arcturus and the second of Libra. I first saw it, when a line drawn through the third and fifth of Bootes, produced, met a line drawn from the first, between the tenth and eleventh of the Serpent-bearer, and between the first and fifth of the Serpent. Near the junction of these lines was the comet, on the barren space called Mount Mænalus.

His motion soon pointed out that he should cross the Serpent; and, on our patent-paper, the stars in the head of that constellation were to be marked down. Cloudy weather prevented my observations, and I had not a good one till it had approached the second of Hercules, the two stars, the second and third of this constellation, being excellent guides to it. At this moment of writing (the 20th of October), the comet has travelled considerably beyond the second of Hercules, and is in the triangle formed by the second, fourth, and sixth of this constellation; of course these three stars were to be marked down on the patent paper, and it is seen nearest the line between the second and sixth, and about midway between them, and nearly six degrees from each. From the observatories of Europe we expect a good account of each day's progress, and thence a delineation of its path. Some astronomers have already settled this point, but they are foreign astronomers: the English astronomers, very properly, take more time before they give their conclusions to the world.

The first thing that must have struck you in this moving body, is the difference of its appearance from that of any of the planets. Upon this appearance various conjectures have been formed, which we shall take another opportunity to examine. From its appearance we were naturally led to consider the nature of its motion, and here we find a very extraordinary character, that, instead of moving as the planets under our observation near to the Sun's apparent path, this body has quite a different direction, and when seen, on the 29th of October, was upwards of forty-five degrees from the Sun's apparent path. We shall find it difficult, I fear, to represent its motion on our pasteboard; we may, from observations, know its geocentric longitude for each day, but then, how are we to place it, if we knew its distance from the Sun, so as to give us an idea of its motion?

As we considered the motion of the Moon, without respect to any of the planets, and conceived only a Sun, Moon, Earth, and fixed stars, perhaps we may do well to represent, on our pasteboard, a Sun, Earth, and comet, supposing them, for a time, to be the only objects with which, excepting the fixed stars, we are conversant. Let the Sun then be, as before represented to be, in the centre of the pasteboard, round which a circle is drawn, of half an inch in diameter, to represent the Earth's path round him; and let us first suppose, that the comet moved in the same plane with the Earth, that is, it may be represented as moving on the pasteboard, and we will use a comet-bead, as before we used a planet-bead. But here comes a difficulty: the comet does not move, like the Earth, in a round resembling a circle, but in a round resembling an ellipse, and this ellipse, or oval, has a very great length compared with its breadth. To make one, we will suppose that the comet, in going round the Sun, comes as near to it as one quarter of the distance of the Earth from the Sun, and removes from it to such a distance that the whole line between its extreme distances from the Sun shall be thirty inches.

Take a point, one eighth of an inch from the centre of the pasteboard, and through this point and the centre draw a line extending it till the farther end is exactly thirty inches from this. From this end, take a point in the line, at the distance of an eighth of an inch, and fix a needle upright in this point, and also a needle upright in the centre of the pasteboard. A piece of fine thread is now necessary, in which a slip knot is to be made at one end, which is to be passed over the farther needle, and the thread is then to be drawn round the centre needle, and passed quite round it, but not tight. With a pencil or pin you now stretch out the thread, so as to form two lines from the pin to each needle, and you bring the pin round in this manner till it comes near to the point, an eighth of an inch from the centre of the pasteboard, and you loosen the thread till the pin, keeping the thread stretched, is exactly in this point. You now fix the end of the thread that goes round the centre needle, with wax or any other device to the pasteboard, and the length of the thread from the farther needle to the pin, and from the pin to the centre needle, will be exactly thirty inches; apply now a pencil in the room of the pin, and let the point be kept close to the pasteboard, and moved from the point one eighth of an inch from the centre needle till it touches the line drawn through the other needle, and the pencil will thus mark half an ellipse: in the same manner, by carrying the thread round the centre of the needle in the opposite direction, the other half will be formed, and this figure will represent the path in which a comet moves.

Whilst the Earth is going round the Sun, the comet is moving in this round, but at very unequal rates; slow, when it is farthest from the Sun; and fast, when it is near to the Sun: we may judge of its rates by this, that its rate of motion at the end nearest to the Sun, is nearly fifteen times and a half faster* than its motion at the farther end, and whilst it is making one round, the Earth is making nearly a hundred and sixty-four rounds and a half. Let the Earth and comet then set off together, the comet being at the farthest end from the Sun, and the Earth in the line between the comet and the Sun: and both comet and Earth, if seen from the Sun, be in the beginning of the first sign, and the comet also seen from the Earth, be in the first sign; that is, the thread drawn from the centre, over the planet and comet beads, will cut the circle round the Earth, as well as the circle round the Sun, in the first sign. Leaving you some time to adjust these motions, I proceed to describe the motion of the Moon and planets during this month.

On the 1st, the Moon is on the meridian at two minutes past ten, having above her, but a little to the west of the meridian, the four small stars of the Water-pot; and under her, near to the horizon, but to the east of the meridian, Fomalhaut; Jupiter is under her, a little to the east of the meridian, and at the distance of about six degrees and a quarter, being in a line nearly with the two western of the four stars in square and Fomalhaut, all to the east of the meridian. At nine, she was fifty-six degrees fifty-one minutes and a half from the first of the Ram. On the 2d, she is on the meridian at forty-six minutes past ten, when Jupiter is below her to the west of it; and of course the two western of the four stars in square, and Fomalhaut, are also to the west of it; above, and near her, is the third of the Fishes, and high up, the two eastern of the four stars in square, to the east of the meridian; the meridian being nearer to the western than to the eastern stars. At nine, she is fifty-four degrees and a half from the first of the Eagle, and seventy-seven degrees twenty-three minutes from Aldebaran. On the 3d, she is on the meridian at half past eleven, being directly under the two eastern of the four stars in square; of course the two western, with Jupiter, and Fomalhaut, are removed considerably to the west of it. At nine, she is sixty-five degrees twelve minutes from Aldebaran, and sixty-five degrees fourteen minutes from the first of the Eagle.

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* 15,546 times faster.

On the 4th is new Moon at eighteen minutes past two in the afternoon, but without an eclipse, the Moon being two degrees and three quarters from the ecliptick, or Sun's apparent path. In the evening, she rises under the four stars in square, being in the line of the second and third of Pegasus, the opposite corners of the square. The three first stars of the Ram rise nearly at the same time, but to the north of her; and as she mounts the heavens, we shall notice, under her, the middle of the Whale. At nine, she is seventy-six degrees seven minutes from the first of the Eagle, and fifty-three degrees nine minutes from Aldebaran. On the 5th, she rises soon after the three first stars of the Ram, which are near to her, but above, to the north. Before midnight, she passes the line drawn through the second and third of the Ram, and as she mounts the heavens, we perceive her to be nearly in the line between the third of Pegasus, the lowest of the four stars in square, and the first of the Whale. At nine, she is forty-one degrees thirteen minutes from Aldebaran, and eighty-seven degrees from the first of the Eagle.

On the sixth, the Moon rises directly under the three first stars of the Ram; and, as she mounts the heavens, is perceived to be in a line with those stars and the first of the Whale, passing the line between the first of the Ram and the first of the Whale before midnight. At nine, she is twenty-nine degrees twenty-four minutes from Aldebaran, and fifty degrees twelve minutes from the first of Pegasus. On the 7th, she passes the ecliptick in the morning; and, in the evening, rises about the same time with the Pleiades, which are to the north of her; and, as she mounts the heavens, is perceived to be in the triangle, whose points are the Pleiades, the first of the Ram, and the first of the Whale, but much nearest to the Pleiades, passing the line between these stars and the first of the Whale before midnight. At nine, she is sixty-one degrees twenty-five minutes from the first of Pegasus.

On the 8th, the Moon rises directly under the Pleiades, and, as she mounts the heavens, is perceived to be in the line with these stars and Aldebaran: she is directing her course to the fifth of the Bull; and, at nine, is seventy-two degrees forty-four minutes from the first of Pegasus. On the 9th, she rises at the same time with Aldebaran, who is to the south of her, having passed the fifth of the Bull between five and six in the morning, this star suffering an occultation. The immersion took place at eighteen minutes and a quarter past five, the star being two minutes and a half south of the Moon's centre. As she mounts the heavens she is perceived to be between the horns of the Bull and Aldebaran; and, at nine, is forty degrees thirty-three minutes from the first of the Ram.

On the 10th, the Moon rises under the sixth of the Bull, having passed this star at fifty-nine minutes past one in the afternoon; she is soon followed by the stars in the Twins; and, as she mounts the heavens, we notice around her the beautiful stars in the Twins, the Bull, and Orion. At nine, she is fifty-two degrees thirteen minutes from the first of the Ram. On the 11th, she rises under the thirteenth of the Twins, having passed this star at forty-nine minutes past one in the afternoon. She is soon followed by the third of the Twins; and, as she mounts the heavens, is perceived to be in the line between this star and the first of the Twins, and to pass the line between the third and second of the Twins before midnight. On the 12th, at her rising the two first stars of the Twins are seen above her to the north, the third of the Twins and Orion to the south of her, and as she mounts the heavens we perceive below her the two first stars of the lesser Dog, being at midnight in the line between the second of the Twins and the first of the lesser Dog.

On the 13th, the Moon rises under the two first stars of the Twins, being almost in the line drawn through these two stars, and produced. She rises before midnight, and during the morning of the 14th is perceived to be in a line with the first of the Lesser Dog and the stars in the head of the Lion. On the 15th, she rises in the morning, and is soon followed by Mars and the first of the Lion, which will form with her a pleasing object to the traveller by night. On the 16th, she rises directly under Mars and the first of the Lion. On the 17th, she rises under the body of the Lion; and during the morning the first and second of the Lion and Mars around her will attract our attention. On the 19th is new

Moon at fifty-four minutes past four in the afternoon, at which time she is one degree twenty-eight minutes and fifty seconds in her upright south of the eclipticks, or Sun's apparent path; and this path she does not pass till the next day, being at noon on the 20th twenty-three minutes ten seconds south of the eclipticks, and at midnight eighteen minutes fifty-one seconds north of the Sun's path. Yet there is an eclipse of the Sun on the 19th at the time of new Moon, though it is not visible in our island: the reason of this I leave to your solution, observing only, that the apparent diameter of the Sun at the time of the eclipse is thirty-two minutes twelve seconds and a half, and of the Moon thirty-two minutes forty-three seconds and twenty thirds.

On the 21st, the crescent of the Moon will be seen after sun-set near the horizon, and south-west by west, Saturn being under her, whom she passed this morning at twenty-eight minutes past nine, and above her is the second of the Scorpion. On the 22d, she appears above the second of the Scorpion, and below her is the first of this constellation. On the 23d, she is above the seventeenth of the Serpent-bearer, having passed this star at twenty minutes past four in the morning. On the 24th, she is above the small stars in the head of the Archer, the two first stars of the Goat being at a considerable distance above her. On the 25th, she is on the meridian at forty minutes past five, being in the line between the small stars in the head of the Archer and the two first stars of the Goat, the former stars being below her to the west, and the latter above her to the east of the meridian. At six, she is fifty-six degrees forty-seven minutes from the first of Pegasus. On the 26th, she is on the meridian at thirty-two minutes past six, the two first stars of the Goat being to the west of the meridian; the second or lowest of these stars she passed at thirty-seven minutes past six in the morning. Above her are the fifth and twelfth of the Water-bearer, and to the east the second and first of this constellation, and, further eastward, Jupiter. At six she is forty-four degrees nineteen minutes from the first of Pegasus.

On the 27th, the Moon is on the meridian at twenty minutes past seven, the second of the Water-bearer being directly above her, the first with the four small stars of the Water-pot and Jupiter under them, to the east of her, will fix our attention. At nine, she is seventy-two degrees ten minutes, and, at six, seventy-three degrees forty-four minutes from the first of the Ram. On the 28th, she is on the meridian at six minutes past eight, the four small stars in the Water-pot being directly above her, the two western of the four stars in square, Jupiter and Fomalhaut, calling our attention to the east of the meridian. At six, she is sixty-one degrees nineteen minutes, and, at nine, fifty-nine degrees forty-seven minutes from the first of the Ram. On the 29th, the Moon is on the meridian at fifty minutes past eight, having passed the line drawn through the two western of the four stars in square, Jupiter and Fomalhaut, which are now seen near to, but to the west of, the meridian. At six, she is eighty-one degrees fifty-six minutes, and, at nine, eighty degrees twenty-four minutes from Aldebaran; and, at six, fifty degrees thirty-five minutes, and, at nine, fifty-one degrees fifty-three minutes from the first of the Eagle.

On the 30th, the Moon is on the meridian at thirty-three minutes past nine, being now near the line drawn through the two eastern of the four stars in square, which are above her, the two western, with Jupiter and Fomalhaut, being considerably to the west of the meridian. At six, she is sixty-nine degrees forty-six minutes from Aldebaran, and sixty-one degrees nine minutes from the first of the Eagle; and at nine, she is sixty-eight degrees sixteen minutes from Aldebaran, and sixty-two degrees and a half from the first of the Eagle. On the 31st, she is on the meridian at sixteen minutes past ten, the four stars in square being to the west, and the three first stars of the Ram to the east of the meridian. At forty-nine minutes past eight, her eastern limb touched the fourth of the Fishes, the star being five minutes and three quarters north of her centre, and the star was covered till five minutes and a half past ten, emerging from the western limb at five minutes and a half past ten, the star being four minutes and a quarter from the centre. At six, she is fifty-seven degrees forty-five minutes from Aldebaran, and seventy-one degrees fifty-six minutes from the first of the Eagle; and at nine, she is fifty-six degrees and a quarter from Aldebaran, and seventy-three degrees seventeen minutes from the first of the Eagle.

Mercury is an evening star, but so near to the horizon when the Sun sets, that he will not often be seen, and then only towards the latter end of the month, by the keen observer. The Moon passes him on the 21st.

Venus is an evening star, not two degrees and a half, on the 1st, from Mercury. She appears every succeeding night higher above the horizon, but still too near the horizon to be seen frequently till the end of the month. On the 9th, she is only six minutes from the eleventh of the Virgin, the star being north of her, and, of course, being very near to Herschell. On the 15th, she is thirteen minutes and a half from the first of the Balance, the star being to the north of her; on the 25th, nineteen minutes from the tenth of the Balance, the star being to the north of her; and on the 28th, thirty-one minutes from the eleventh of the Balance, this star being also to the north of her. If she had been higher above the horizon, her passage by Herschell and Saturn, and the passage of Mercury by her, would have made this a very interesting month. The Moon passes her on the morning of the 21st.

Mars is a morning star, being seen at first to the west of the first of the Lion, which star he passes on the 11th at the distance of fifty-five minutes and a half, the star being to the south of him; from this star he continues his course direct, finishing it to the west of the twenty-second of the Lion. The Moon passes him on the 15th.

Jupiter is on the meridian, on the 1st, at seventeen minutes past ten at night, and, on the 25th, at forty-two minutes past eight, having a retrograde motion through a degree and three quarters, being near the line between the two western of the four stars in square and Fomalhaut. Near him is the eleventh of the Water-bearer, and to the west of him the four small stars of the Water-pot. The Moon passes him on the morning of the 21st.

Saturn is an evening star, being seen after dusk in the south-west by west, but near to the horizon. He has a direct motion through nearly three degrees and a half under the five small stars called the sixth of the Balance. As he is approaching this conjunction, it is obvious that we cannot expect to see him much during this month. The Moon passes him on the morning of the 21st.

Herschell is a morning star, too near the Sun to be visible, being in his conjunction, on the 28th, at eleven in the morning.

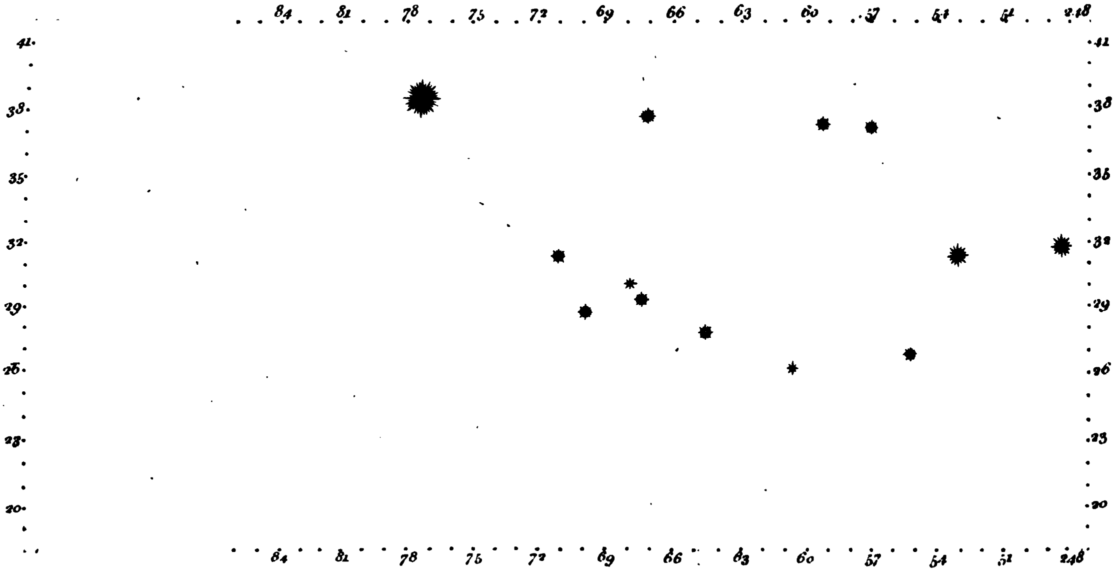
The appearances of the fixed stars during this month, at any hour of the night, will be known by consulting the following table, and reading the description of the position refered to in the volume for 1806.

Pos.	1		8		16		25	
	h.	m.	h.	m.	h.	m.	h.	m.
VIII.	7	3	6	38	6	8	5	34
IX.	9	6	8	41	8	11	7	37
X.	11	1	10	36	10	6	9	32
XI.	1	2	0	37	0	7	11	33
XII.	3	8	2	43	2	13	1	39
I.	4	58	4	33	4	3	3	29
II.					6	6	5	32

1808

PLATE VI.

page 210.



NOVEMBER, 1808.

I DID not expect to have an opportunity of committing any farther observations on the comet, before this part of my work went to the press; but on the 29th of October I had an opportunity of tracing its progress on the patent paper, by noting, that it had made a considerable progress in the triangle formed by the second, the fourth, and the sixth of Hercules; and its place was sufficiently marked by observing, that the lines drawn by the hand from the fourth to the fifth, and from the comet to the sixth, were parallel; and also the lines drawn from the fifth to the sixth, and from the fourth to the comet, were parallel. Thus the three stars, the fourth, the fifth, and the sixth of Hercules formed, with the comet, an oblong: and my attention was now bent towards its motion through the triangle formed by the three stars, the fourth, the fifth, and the sixth.

The next time of viewing it was on the clear night of the 31st of October, when it appeared under the three stars, the fourth, fifth, and sixth of Hercules, not having reached the line drawn from the fourth to the sixth. Its place under these stars was well ascertained by observing, that it was in the line drawn from the second through the star numbered 172 of Hercules, and produced. This star 172 is a star of the fifth magnitude, which will strike you in drawing a line from the third through the second of Hercules, and producing it. Under the line between the fourth and sixth was the comet at nine o'clock at night, about a third of a degree from it; and I expected to see the comet on the following night a little beyond this line.

In this expectation I was disappointed, from the badness of the weather, and I did not see it again till the 3d of November. At the first appearance of the comet, and surrounding stars, I perceived that the line between the fourth and fifth of Hercules passed under it; but the comet was near that line, being from it not half a degree. Thus it had passed through the triangle formed by the three stars, the fourth, fifth, and sixth; and its direction being still in the line drawn through the second and the star 172, it evidently was moving towards the first of the Harp.

On the following night I had another view of it, when it was evidently receding fast from the line between the fourth and fifth of Hercules, being, at seven o'clock, about a degree from that line. It was now necessary to take another piece of patent paper, to trace its path between the adjacent stars, the first of the Harp being at the end of the vista. It was sufficient, at first, to mark down the sixteenth, the seventeenth, and the eighth, on the one hand; the eleventh, the twelfth, and the fourteenth, on the other; but the weather has been so unfavourable, that I must give the printer this sheet without having been able to make one observation on its farther progress. Before the end of the month it will probably have reached the first of the Harp, having then travelled through nearly sixty degrees since it was first noticed in this island, a degree of motion whose rapidity we cannot ascertain till we are better acquainted with its distance.

How are we to represent such a motion on our pasteboard? Let us suppose that this comet really moved so, that if it had been represented by a ball of wax on the top of a needle fixed into a cork, the cork would have moved in the round or ellipse which we have drawn on our pasteboard. The thread drawn from the earth-ball to the comet-ball will now make, on the pasteboard, the same angle that the comet appeared under each night, when compared with the Sun's path; but it is evident that this angle will very far exceed that made in a similar manner, by a thread drawn from the earth-ball to any of the planet-balls. Needles will no longer serve us, and the wire must be long if we employ it for our purpose. Indeed there is no limit to the length of wire that might be required; for, in passing round the Sun, the comet, on coming over the earth, might be in the direct line upwards, and the next motion would place it in such a place, that the thread drawn to the comet-ball must be many thousand or millions of miles in length. Our astronomers will, probably, before my next year's volume is come out, have ascertained the round or ellipse in which the comet moves round the Sun, as also the height it appeared to be above the plane of the Sun's path, from which we may determine the heights of the wires requisite to explain its motion on any scale which we choose to lay down. But the consideration of these heights have already removed the fears you might be apt to entertain of a comet injuring the earth by its motion; this apprehension may seize a vulgar mind, which has a very imperfect view of the grandeur of the immense system in which we have been placed by our great Creator: but, in the material as well as the moral world, not any thing happens without his direction and controul. The comet traces out the immensity of space by his word: and we, whether we will it or not, can be the instruments only of his will. Happy, if our minds are in unison with his wisdom; miserable, through our own folly: for trifling is the power, not of a nation merely, but of a whole world in arms against a man who possesses the blessings of a good conscience.

On the 1st, the Moon is on the meridian at eleven o'clock at night, the three first stars of the Ram being above her, but to the east of the meridian; and the first of the Whale, with the small stars in its head, below her, and at a greater distance from the meridian. Jupiter, on the western side, and Orion, on the eastern side, will fix our attention. At nine, she was eighty-four degrees eight minutes from the first of the Eagle. On the 2d, she is on the meridian at forty-four minutes past eleven, being in a direct line with the first of the Whale, and the three first stars of the Ram; the first of the Whale being below her, to the east; and the first of the Ram above her, to the west of the meridian: during the night, therefore, we may observe her motion to and beyond this line. At nine, she is forty-seven degrees fifteen minutes from the first of Pegasus. On the 3d, she passes the ecliptick in the morning, and suffers an eclipse, which is not visible to us in this island, as she sets before the eclipse commences; it begins at thirty-two minutes past six in the morning, and ends at twenty-five minutes past ten. In the evening we see her rising at the same time with the Pleiades, which are to the north of her, and nearly under the three first stars of the Ram, to the south of her. As she mounts the heavens we perceive her to be crossing the triangle formed by the three first stars of the Ram, the Pleiades, and the first of the Whale; but she does not pass the line between the Pleiades and the first of the Whale before sun-rise. At six, she is fifty-seven degrees two minutes; and, at nine, fifty-eight degrees twenty-six minutes from the first of Pegasus.

On the 4th, the Moon rises under the Pleiades, and just reaches the line between the Pleiades and Aldebaran before sun-rise; she is directing her course to the fifth of the Bull, above Aldebaran; and at six, she is sixty-eight degrees twenty minutes; and at nine, sixty-nine degrees forty-six minutes from the first of Pegasus. On the 5th, she rises at the same time with Aldebaran, under the fifth of the Bull, having passed this latter star before noon. As she mounts the heavens she is followed by Orion, and during the night this constellation, with Aldebaran, will fix our attention on the Moon's progress. At six, she is thirty-six degrees eight minutes; and at nine, thirty-seven degrees eight minutes from the first of the Ram. On the 6th, she rises near the sixth of the Bull, or tip of the southern horn, and she passes this star at a quarter past eight. As she mounts the heavens we shall notice above her the second of the Bull, and below her Orion; to the west Aldebaran, and to the east the Twins. At nine, she is forty-nine degrees nine minutes and a half from the first of the Ram.

On the 7th, the Moon rises under the seventh and twelfth of the Twins, and near the thirteenth, which last star she passes at thirteen minutes past eight; under her we notice, as she mounts the heavens, the third of the Twins; and during the night, perceive that she passes the line between the first of Orion and the first of the Twins. At nine, she is twenty-seven degrees twenty minutes from Aldebaran. On the 8th, the two first stars of the Twins are above and to the north of her at her rising; and as she mounts the heavens, we perceive her to be between these stars and the two first stars of the Lesser Dog. At nine, she is thirty-nine degrees twenty-eight minutes from Aldebaran. On the 9th, she rises under the two first stars of the Twins, but not in the direct line passing through them, but this line she reaches soon after midnight, At nine, she is fifty-one degrees fifty-one minutes from Aldebaran.

On the 10th, the Moon rises under and soon after the two stars, called the first of the Crab, having passed the first at eight minutes past six, and the second first at eight minutes past seven this evening; as she mounts the heavens, we shall perceive her to be in a line between the first of the Lesser Dog and the first of the Lion, but much nearer to the latter star, and which is also nearer to the Moon than to Mars, who is to the east of it. On the 11th, she rises near midnight, nearly with the first of the Lion, passing the seventeenth at fifty minutes past eleven; as she mounts the heavens, on the 12th, we perceive Mars under the line between her and the second of the Lion, and the stars in the head of this constellation above her, may attract notice. On the 13th, she rises, in the morning, nearly at the same time with Mars, who is upon the horizon between her and the second of the Lion; as she mounts the heavens, we notice Regulus and the stars in the head, above her. On the 14th, she rises under the second of the Virgin, and Mars, being nearly in the same line with the star and the second of the Lion: as she mounts the heavens, we perceive that she is directing her course under the five stars in triangle to the first of the Virgin. On the 15th, she rises under the five stars in triangle, and is soon followed by the first of the Virgin. And on the 18th, is new Moon, and an eclipse. She passes the ecliptick on the 17th, in the morning, and at midnight, is nearly one degree three minutes, in her upright, to the north of the eclipticK. The conjunction of the Sun and Moon is at fifty-five minutes and a quarter past two in the morning of the 18th, when the Moon is one degree thirteen minutes in her upright north of the eclipticK, her apparent diameter at that time being thirty-three minutes, thirty-one seconds, and the apparent diameter of the Sun thirty-two minutes twenty-seven seconds. Though the Moon is thus between the Earth and Sun, it evidently cannot make any eclipse to us, as the Sun is not visible at that time in this island.

On the 20th, soon after sun-set, we perceive the crescent of the Moon above Venus, to the south of south-west. On the 21st, the Moon is perceived between the small stars in the head of the Archer and the two first stars of the Goat, the latter stars being above, and the former below her. On the 22d, she is near to the second of the Goat, having passed this star at thirty-two minutes past two in the afternoon. At six o'clock she is forty-eight degrees eighteen minutes from the first of the Pegasus. On the 23d, she is on the meridian at twelve minutes past five, the second of the Water-bearer being above her to the east of the meridian, and Jupiter at a considerable distance eastward to the east of the four small stars in the Water-pot. At six, she is thirty-five degrees fifty-nine minutes, and, at nine, thirty-four degrees thirty-one minutes from the first of Pegasus.

On the 24th, the Moon is on the meridian at six, being then directly under the first of the Water-bearer, the four small stars in the Water-pot being to the east of the meridian, and Jupiter below them rather more to the eastward. At this time she is sixty-four degrees forty minutes, and, at nine, sixty-three degrees six minutes from the first of the Ram. On the 25th, she is on the meridian at forty-four minutes past six, Jupiter being almost directly below her; and the meridian is marked by the two western of the four stars in square above her, and Fomalhaut near the horizon. At six, she is fifty-two degrees seventeen minutes, and, at nine, fifty degrees forty-six minutes from the first of the Ram. On the 26th, she is on the meridian at twenty-eight minutes past seven, being under the four stars in square, but nearest to the two eastern of these stars which are to the east of the meridian, the two western, with Jupiter and Fomalhaut, being now to the west of the meridian. At nine, she is seventy-one degrees seventeen minutes, and, at six, seventy-two degrees forty-eight minutes from Aldebaran.

On the 27th, the Moon is on the meridian at ten minutes past eight, the two eastern of the four stars in square being above her, but to the west of the meridian, and the three stars of the Ram and the first of the Whale considerably to the east of the meridian. At six, she is sixty degrees forty-four minutes, and at nine fifty-nine degrees fourteen minutes from Aldebaran. On the 28th, she is on the meridian at fifty-three minutes past eight, the three first stars of the Ram being above her, and the first of the Whale with the stars in its head below her, to the east of the meridian. At six, she is forty-eight degrees forty-nine minutes, and at nine, forty-seven degrees twenty minutes from Aldebaran. On the 29th, she is on the meridian at thirty-seven minutes past nine, the three first stars of the Ram being directly above her, and the first of the Whale below her, to the east of the meridian. At six, she is thirty-seven degrees from Aldebaran, and forty-three degrees from the first of Pegasus; and, at nine, she is thirty-five degrees thirty-two minutes from

Aldebaran, and forty-four degrees twenty-seven minutes, from the first of Pegasus. On the 30th, she is on the meridian at twenty-one minutes past ten, the first of the Whale being almost directly below her, and above her the Pleiades to the east, and the three first stars of the Ram to the west of the meridian. On this day she passes the ecliptick, or Sun's apparent path, but, for obvious reasons, without producing an eclipse. At six, she is twenty-five degrees fifteen minutes from Aldebaran, and fifty-four degrees nine minutes from the first of Pegasus; and, at nine, she is twenty-three degrees forty-seven minutes from Aldebaran, and fifty-five degrees thirty-three minutes from the first of Pegasus.

Mercury is first an evening star, setting soon after the Sun, and being in its inferior conjunction on the 18th at three in the morning. During the latter part of the month, therefore, it is a morning star; and it moves so fast from the Sun, after the conjunction, that towards the end of the month he will be the bright harbinger of light, and frequently saluted as the morning star. He passes Saturn near the conjunction, and is seen from the 26th to the 30th, every morning, under the two first stars of the Balance. On the 30th, at sun-rise, he is fifteen degrees above the horizon, in the south-east.

Venus is an evening star, setting, on the 1st, within an hour after the Sun, in the south-west by west. Her stay above the horizon grows every evening longer. On the 1st, she is nearly in a line between the second and first of the Scorpion, being about two degrees from the second; and, on the 14th, she passes the eighth and the second, or star sometimes called B of the Serpent-bearer, being only forty-two minutes from the eighth, this star being to the south of her, and thirteen minutes to the north of B. On the 26th, she passes the eleventh of the Archer, this star being thirty-four minutes south of her; she was the day before in the line between the two twelfths of this constellation and the eleventh. Her progress is through about twenty-eight degrees; and on the 25th she is, at sun-set, nearly fifteen degrees above the horizon, in south by west.

Mars is a morning star, being on the meridian at twenty-three minutes past eight on the morning of the 1st, and at thirty-five minutes past seven on the morning of the 25th. His motion is direct from a point about two degrees to the west of the twenty-second of the Lion, to a point about two degrees to the east of the second of the Virgin. He moves through nearly seventeen degrees. On the 5th, he passes the twenty-second of the Lion, and, on the 12th, the eighteenth of this constellation. He now moves through a barren space under the fourth, eighth, and second of the Lion, and passes the second of the Virgin on the 28th. The Moon passes him on the morning of the 13th.

Jupiter is on the meridian at fourteen minutes past eight at night of the 1st, and at thirty-nine minutes past six at night of the 25th. The whole month is very favourable, therefore, for observations on this planet. On the 3d, he is stationary, and of course his motion is very slow, passing from that time through only one degree and a third, but with a direct motion. On the 24th he passes the eleventh of the Water-bearer, the star being distant from him only fifty-five minutes to the north. The chief features near him are the four small stars in triangle of the

Water-pot, and, at a considerable distance, the four stars in square, the line passing through the two western of these stars being to the east of him. The Moon passes him on the 24th.

Saturn is in conjunction with the Sun on the 16th at midnight, and of course is too near the Sun to be visible this month, but to very keen observers, as a morning star towards the end of the month.

Herschell is a morning star, but too near the Sun to be visible in the former part of the month. On the 11th, he is about ten degrees above the horizon, near south-east by east, being then under the tenth of the Virgin, and he will gain height every succeeding day. His motion is direct through about a degree and three quarters. The Moon passes him on the night of the 16th.

The appearances of the fixed stars during this month will be known, for any hour of the night, by consulting the following table, and reading the description of each position in the volume for 1806.

Pos.	1		8		16		24	
	h.	m.	h.	m.	h.	m.	h.	m.
VIII.	5	6	4	39	4	7		
IX.	7	9	6	42	6	10	5	36
X.	9	4	8	37	8	5	7	31
XI.	11	5	10	38	10	6	9	32
XII.	1	11	0	44	0	12	11	38
I.	3	1	2	34	2	2	1	28
II.	5	4	4	37	4	5	3	31
III.	6	53	6	26	5	54	5	20

DECEMBER, 1808.

TWO kinds of alarm have seized mankind on the appearance of a comet; the one, that it foreboded mischief to the Earth in its political state; the other, that it might destroy the very Earth itself. The former of these alarms has subsided, for none but the very ignorant and superstitious in the higher and lower classes of society now believe that the intrigues of cabinets are directed by bodies wandering in the heavens, or that by their influence a battle is won or lost. The flourishing or miserable state of a kingdom is properly referred to another cause: the wilderness is turned into a fruitful soil, or fertile fields into stagnant pools, from the energy or sloth of those who dwell on them, under the directions of Him who causes the seasons, and has given the earth to man to be a residence suitable to a rational being.

On the probability, that the earth may be destroyed by a comet, even wise men have formed conjectures; but they have none of them, that I know of, entered upon the calculation in the manner which the subject required. We first conceived a comet to move in the same plane with that in which the Earth moves round the Sun; and it is certain, that if a great number of comets was moving in this plane, we might naturally expect that some or other of them would affect the motion of the Earth, and one might give it a shock which should dissolve the globe itself, and leave not a wreck behind. To do this, many millions of comets must be moving on this plane; but, as far as our knowledge at present reaches, not one is known to move in this plane; and we may rest perfectly secured, that we are not to receive danger from a comet moving in the plane of the Earth's orbit.

If we consider the comets that are moving in different planes (and there are thousands upon thousands, I presume, of such bodies), the probability of the Earth's receiving an injury from any of them is decreased to so small a number, that it is scarcely possible for the human mind to conceive that such an event should take place in the endless revolution of ages. The coming of a comet must raise the mind to higher thoughts; the lowest of our species are not so abject, or lost in the groveling pursuits of wealth or of ambition, not to be roused by the appearance of these bodies, and to reflect a little on the place they are appointed to hold in this universe. What a grand idea is presented to them! A sun in the middle of a system, round which are rolling bodies in every direction, so contrived, by the wisdom of the Creator, that all shall perform their motions with regularity and precision; some keeping nearly the same distance from the common centre; others, for purposes unknown to us, traversing the immense regions of space, and seeming to be travelling to such a distance that to them is no return.

No return is indeed made in the life of the earthly generation which once sees it. We have seen the comet of the last year: where will it be when we are returned to our parent earth, and are mouldered into that dust of which we were originally composed? What are the generations of man in this computation? How idle do all their speculations appear! The thought may appal the features of vice, but virtue never fades. The works of the good man continue through endless ages; and, when not a trace of his earthly body can be discovered, he is beneficial to the remotest posterity. We may measure by time the motions of planets and comets; but to the reasonable creation the length or shortness of time enters not into our calculations. The years of a comet will not measure the existence to which we are approaching, and to which we ought all to aspire. Our great Head is gone before us, to prepare for us places in the mansions of his heavenly Father; and several comets have repeated their travels round the sun since he quitted the earth, and left us those precepts, and that example, by which, if we had been guided, the confusion that now prevails in the world would not be known; but, animated by a true christian spirit, we should all be employed in increasing our own, by promoting each other's happiness.

These reflections naturally arise out of such a subject; and I trust that my readers will not only approve of the insertion of them in a work like this, but constantly bear in mind, that ennobling as is the science of astronomy, it is of little use if we are contented with mere passive admiration, and our thoughts are not carried by it to our great Creator. A mere mechanical philosopher is a wretched being. He views the motions of the heavens as he would those of the clock: he thinks much of the work, little of the workman. But how tame and mean are such sentiments, when we reflect that the objects, which we are contemplating, are moved by the mighty hand of Him, who, though so infinitely exalted above us, deigns to be addressed under the name, and bears towards us the affection of a Father! But these thoughts would carry me too far at present, and I proceed to the motions of the heavenly bodies, as we shall observe them during the course of this month.

On the 1st of this month, the Moon is on the meridian at seven minutes past eleven, the Pleiades being directly above her, the third of the River below her, but a little to the east of the meridian; Aldebaran to the east of, and the three first stars of the Ram, and the first of the Whale, to the west of the meridian. At nine, she is fifty-five degrees twenty minutes from the second of the Twins, and sixty-six degrees fifty-one minutes from the first of Pegasus. On the 2d, she is on the meridian at fifty-five minutes past eleven; Aldebaran being below her, and the fifth of the Bull, to the west of the meridian, as she passed this latter star at twenty-three minutes past five in the afternoon. The two stars at the tips of the Bull's horns are, of course, to the east of her; and below them Orion will, notwithstanding the powerful brightness of the Moon, display the brilliancy of his chief stars. To the west of the meridian, are the Pleiades, above the Moon; and below her, the third of the River. At nine, she is forty-three degrees fifty-one minutes from the second of the Twins, and seventy-eight degrees eighteen minutes from the first of Pegasus.

On the 3d is full Moon, at thirty-five minutes past three in the morning. There is no eclipse, as she is about three degrees from the ecliptick, or Sun's apparent path. At eight, she rises nearly between the tips of the Bull's horns, but she has not reached the line between these two stars. During the night we may observe her passage by the sixth, or star in the southern tip, as she passes it before sun-rise. The bright stars of Orion, Aldebaran, Capella, the three first stars of the Twins, and the two of the Lesser Dog will, as she mounts the heavens, claim our attention round her. At nine, she is forty-six degrees seventeen minutes from the first of the Ram. On the 4th, she rises under the sixth of the Bull, which star she passed at seven minutes past two this morning; the two first stars of the Twins are, at her rising, near the horizon, to the north of her, the first above, the second below it; as she mounts the heavens, we notice, under her, the third of the Twins, and the first of the Lesser Dog. At nine, she is fifty-eight degrees seven minutes from the first of the Ram.

On the 5th, the Moon rises under the thirteenth of the Twins; having passed this star at fifty-five minutes past one in the morning. As she mounts the heavens, we perceive her to be near the line between the third and second of the Twins. At nine, she is thirty-six degrees thirty-seven minutes from Aldebaran. On the 6th, she rises below the two first stars of the Twins, but she has not reached the line drawn through these two stars and produced; as she mounts the heavens, we perceive her to be between the two first stars of the Twins, and the two first of the Lesser Dog. At nine, she is forty-eight degrees fifty-seven minutes from Aldebaran. On the 7th, she rises under the two small stars of the Crab, called the northern and southern Asses, and above the two stars called the first of this constellation; one of the latter stars, the first, suffers an occultation, which commences at a quarter past ten, the star being thirteen minutes and a quarter north of the Moon's centre, and ends at forty-eight minutes and a half past ten, the star being twelve minutes and forty seconds north of the Moon's centre. As she mounts the heavens, we notice, above her, the two first of the Twins; and, below her, the first of the Lion, all at a considerable distance. At nine, she is sixty-one degrees twenty-nine minutes from Aldebaran.

On the 8th, the Moon rises a little before the first of the Lion; which, as she mounts the heavens, is perceived to be the brightest star near to her. On the 9th, she rises under the first of the Lion, and, as she mounts the heavens, that star, with those in the Lion's head, above it, will attract notice; and our attention will be called to Mars, and the second of the Lion below it. On the 10th, she rises about midnight, and during the morning of the 11th, is seen under the constellation of the Lion, Mars being below her. On the 12th, she rises in the morning, below Mars, which will be the most conspicuous figure near her till sun-rise: under her, as she mounts the heavens, will be seen the first of the Virgin. On the 13th, she rises above the first of the Virgin, and under Mars; the star she passes at thirty-three minutes past five in the morning. On the 14th, she rises with the eleventh of the Virgin, which star she passes at fourteen minutes past three in the morning; below her is Herschell, whom she passes at twenty-three minutes past nine, the planet being between her and the first of the Balance. On this day she passes the ecliptick, but, for obvious reasons, without an eclipse. On the 15th, she rises under the two first stars of the Balance, and near to Saturn, whom she passes at fifty-three minutes past five in the afternoon; and on the 17th is new Moon, at thirty-six minutes past one in the afternoon; there being no eclipse, as she is upwards of three degrees and a half from the ecliptick, or Sun's apparent path.

On the 19th, the crescent of the Moon is seen under the two first stars of the Goat, soon after sun-set. On the 20th, she is seen above these stars, and under the fifth and twelfth of this constellation. At six, she is thirty-nine degrees nine minutes from the first of Pegasus. On the

21st, she is seen under the first of the Water-bearer, and the four small stars in the Water-pot, the second of the Water-bearer being near to her; and she has passed the line between that star and Fomalhaut, this latter star being on the meridian between five and six; Jupiter, at this time, being also near the meridian. At six, she is sixty-seven degrees thirty-six minutes from the first of the Ram. On the 22d, she is on the meridian at twenty-seven minute past four, and she will soon after be seen between the four small stars of the Water-pot and Jupiter. At six, she is fifty-six degrees twenty-one minutes from the first of the Ram.

On the 23d, the Moon is on the meridian at twelve minutes past five, being under the four stars in square, the two western being to the west, and the two eastern to the east of the meridian. Jupiter is now below her to the west of the meridian. At six, she is seventy-six degrees thirty-one minutes, and at nine, seventy-four degrees fifty-eight minutes, from Aldebaran. On the 24th, she is on the meridian at fifty-five minutes past five, under the two eastern of the four stars in square. Jupiter is now below her to the west, and at a considerable distance, but nearer to her than the three first stars of the Ram to the east of her. At six, she is sixty-four degrees eleven minutes, and, at nine, sixty-two degrees forty minutes, from Aldebaran. On the 25th, she is on the meridian at thirty-eight minutes past six, being between the fourth and fifth of the Fishes, the three first stars of the Ram and the first of the Whale being at some distance from her to the east of the meridian. At six, she is fifty-two degrees seven minutes, and, at nine, fifty degrees thirty-seven minutes from Aldebaran.

On the 26th, the Moon is on the meridian at twenty-one minutes past seven, the three first stars of the Ram being above her, the second and third directly, but the first to the east of the meridian; below her, is the vast expanse of the Whale, the sixth being midway between her and the horizon; the four small stars in square, below it, at some distance to the east of the meridian, and the second, or tail of the Whale, at a greater distance, and lower to the east of the meridian. Menkar, the first of this constellation, with the small stars in its head, we notice to the east of the meridian, near the middle of the middle region. At six, she is forty-degrees thirteen minutes, and, at nine, thirty-eight degrees forty-four minutes from Aldebaran. On the 27th, she is on the meridian at five minutes past eight, being then nearly in the line between the first of the Ram and the first of the Whale, the line drawn through her and these stars approaching near to the third of the River. Above her on the meridian are the small stars in the Fly, the Pleiades and Aldebaran being to the east of it. On this day she passes the ecliptick, or Sun's apparent path, but, for evident reasons, without producing an eclipse. At six, she is twenty-eight degrees twenty-six minutes, and, at nine, twenty-six degrees fifty-eight minutes from Aldebaran; and, at six, fifty-one degrees nine minutes, and, at nine, fifty-two degrees thirty-two minutes from the first of Pegasus.

On the 28th, the Moon is on the meridian at fifty minutes past eight, being in a line with the Pleiades and Menkar, the first of the Whale, the former stars being above her to the east, the latter below her to the west of the meridian. The three stars of the Ram are now considerably to the west of her; and Aldebaran and Orion with Sirius near the horizon, to the east of her, give splendour to the heavens. At six, she is fifty-nine degrees fifty-eight minutes, and, at nine, fifty-eight degrees thirty-one minutes from the second of the Twins; and, at six, she is sixty-two degrees twenty-one minutes, and, at nine, sixty-three degrees forty-six minutes from the first of Pegasus. On the 29th, she is on the meridian at thirty-seven minutes past nine, Aldebaran being below her to the east, and the Pleiades below her to the west of the meridian. She is directing her course to the fifth of the Bull, which will suffer occultation before sun-rise. To the east of her the two horns of the Bull, and Orion below them, will excite attention. At six, she is forty-eight degrees twenty-seven minutes, and, at nine, forty-seven degrees one minute from the second of the Twins; and, at six, thirty degrees eight minutes, and, at nine, thirty-one degrees thirty-three minutes from the first of the Ram.

On the 30th, the Moon is on the meridian at twenty-five minutes past ten at night, having travelled a considerable space since the time when her eastern limb first touched the fifth of the Bull. This was at thirty-four minutes before one in the morning, when the star was two minutes north of the Moon's centre; and at thirty-seven minutes past one it emerged from the western limb, the star being six minutes twenty seconds north of the centre. At six at night, we see her nearly midway between Aldebaran and the second of the Bull, or tip of the northern horn, directing her course to the sixth, or tip of the southern horn, Orion being below her. At this time she is forty-one degrees eight minutes, and at nine, forty-three degrees five minutes, from the first of the Ram. On the 31st, she is on the meridian at fourteen minutes past eleven, the first of Orion being directly under her, and of course the greater part of the constellation to the west of the meridian; whilst, in the lower, Sirius, to the east of the meridian, attracts our attention. Above her, to the west, are the two horns of the Bull; and, to the east, the three first stars of the Twins, and the two first of the lesser Dog, grace the circle around her. At six, she is fifty-three degrees twenty-six minutes, and, at nine, fifty-four degrees fifty-six minutes, from the first of the Ram.

Mercury is a morning star, and will be the bright harbinger of day in the earlier part of the month. On the 4th, he is at his greatest elongation. The early risers cannot fail of distinguishing him in the south-east before sun-rise. He is under the two first stars of the Balance, and near the third of this constellation. On the 12th, he passes the second of the Scorpion, and we may, on that and future mornings, compare his splendour with that of Antares or the first of the Scorpion. The Moon passes him on the 16th.

Venus is an evening star, and is seen soon after sun-set in the south-west-by-west, and near the small stars in the head of the Archer. Under these stars she passes in the five first days, and travels through a barren space to a point under the line drawn through the two first of the Goat. This line she reaches on the 18th, when the planet and the two stars will form a very pleasing object. She is now directing her course to a point over the third and fourth of this constellation, but she does not reach it till the beginning of the next year. The Moon passes her on the morning of the 20th.

Mars is a morning star, being, on the 1st, on the meridian at twenty minutes past seven in the morning; and, on the 25th, at sixteen minutes past six in the morning. On the 1st, he is about two degrees to the east of the second of the Virgin, and he is travelling along one of the sides of the triangle formed by the five stars in this constellation. On the 12th, he passes the seventh of the Virgin, the star being thirty-six minutes to the south of him; and, on the 23d, the third of this star, which is at one point of the triangle, being forty-four minutes to the north of him. He is directing his course to a point above the first of the Virgin, but does not nearly reach it this year. The Moon passes him on the 11th.

Jupiter is on the meridian at a quarter past six in the evening of the 1st, and at forty-one minutes past four in the afternoon of the 25th. He is seen to the east of the eleventh of the Fishes, being nearly in the line drawn through the two western of the four stars in square, and he has a slow progressive motion through that line, and is a small distance from it. The Moon passes him on the morning of the 23d.

Saturn is a morning star, too near the Sun ~~to be visible in the beginning of the~~ month, but towards the middle we shall perceive him to the west of the second of the Scorpion, and every succeeding morning he is seen to greater advantage. The Moon passes him on the 15th.

Herschell is a morning star, slowly moving, with a direct motion, from the tenth of the Virgin towards the first of the Balance. The Moon passes him on the morning of the 13th.

The places of the fixed stars, for any hour during this month, will be known by consulting the following table, and reading the description of the position referred to in the volume for 1806.

Pos.	1		8		17		25	
	h.	m.	h.	m.	h.	m.	h.	m.
IX.	5	6	4	36	3	56	3	20
X.	7	1	6	31	5	51	5	15
XI.	9	2	8	32	7	52	7	16
XII.	11	8	10	38	9	58	9	22
I.	0	58	0	28	11	48	11	12
II.	3	1	2	31	1	51	1	15
III.	4	50	4	20	3	40	3	4
IV.	7	11	6	41	6	1	5	25
V.			8	32	7	52	7	16

Thus another year is brought to its close, and I flatter myself, that all who will take the pains of following the little plans I have laid down for their amusement, will gradually form clear ideas of astronomy, and understand the motions of the heavenly bodies around them as they really take place in the heavens, and not as a mere matter of theory in books. I am the more convinced of it, by what I have already seen done. It could not be expected, that the patent paper should come in an instant into general use in schools; but the specimens which have been sent me, particularly the path of the comet with the surrounding stars, described by a very young pupil of Mrs. Riley, at Albion-house, Epsom, convince me that the custom will daily gain ground; and young persons will, from their maps formed at school, be never at a loss afterwards to recognise any of the stars within the sphere of their observation. Nothing, indeed, can be easier, than to take from a globe or a catalogue the right ascension and declination of a few stars, not very distant from each other, and place them upon the patent paper in their proper situations, and in the evening to compare the design with their real aspect in the heavens.

Before the next year, Viscount de Vaux will have favoured the public with his thoughts on some important subjects in astronomy. I regretted, when he did me the favour of a visit, that my volume was too far advanced for me to take notice of them; but on second thoughts, it struck me that I ought not to have availed myself of his permission, as they would make their first appearance better from his own pen. The improvement which this gentleman has made in our geographical maps, will, I am persuaded, be in a future time adopted: but the map-sellers must get rid of the stock in hand, before they introduce this elegant method into public notice. The Viscount divides the globe into four quarters, which are really equal, and by his four maps, a true idea, which cannot be easily got from those now in use, will be formed of the relative situation of places on the earth. The merit of his instrument to measure the rate of a ship's motion, must be tried by experiments on the ocean; but whether it succeeds to the utmost of his expectations or not, it is a most elegant contrivance, and worthy of the attention of the mechanic and the philosopher. To the latter it presents an easy method of examining that very difficult question, the resistance of fluids.

But how can I close this volume without a reflection on the loss I sustained whilst I was writing it? and why should I speak of myself only, when there is scarcely a man, educated at Cambridge, who did not experience the sincerest sorrow on the same occasion. He who led me the way to these studies, who was my great encourager in them, and whose approbation of the plan of my book, insured, in my mind, its success, has been suddenly removed from us. The public has little or no opportunity of estimating the merits of my friend Mr. Jones. The elegance of his taste in mathematics and philosophical pursuits, is known only to his pupils, who will never forget with what ease, what animation, and what piety, he introduced, wherever the opportunity offered, those reflections on the wisdom of the Creater, which, in a well-bred mind, every inquiry into his works ought to excite. I was the second of his private pupils; my friend Marsh, the translator of Michaelis, and now Margaret professor of Divinity at Cambridge, was his first; and we together paid the last tribute of affection to his remains. After a few years employed with private pupils, my friend Jones became tutor of Trinity College, in that college where Newton studied, and whom he resembled both in person and in mind. In his college and the university, every duty, whether as fellow, tutor, moderator, or examiner, was performed with the approbation both of the senior and junior part of the university. In the severest acts of discipline his conciliating manners softened the blow to the offending pupil. No one excelled him in firmness of mind and integrity of character. He did not adopt an opinion hastily, nor was it shaken either by the usual allurements of fortune, or the transient gusts of popularity. His religion was founded on those truly christian principles, which refuse to adopt the traditions of man in opposition to the precepts of our Saviour; and, if his enlarged views of nature led him, like Newton, to admire the God of nature in the stupendous works around us, he was more affected by that love which shines conspicuous in revelation, and is the great feature of the christian religion. They who knew him once, will recognise in these lines a few traits in his character; and his pupils are peculiarly called upon to imitate the virtues of their much-beloved tutor.

DESCRIPTION OF THE PLATES.

Plate I.—*The Path of Herschell.*

THE plate shews the path of Herschell, as it appears to an observer during the course of the year, or would appear to him, if he could see the planet, when the light of the Sun obscures him. The planet is, during the whole year, to the north of the ecliptick, but never at a great distance from it. On the 1st, he is four degrees twenty minutes in the eighth sign, the star near to it being the eleventh of the Virgin. From this time he moves directly, or according to the order of the numbers of the sign, that is, from west to east, till the 8th of February; he then moves back again, though not exactly in the same line, yet very near to it, till the 9th of July, when he again takes a turn, and moves directly to the end of the year, the star to the east of him being the first of the Balance, a star of the second magnitude. This plate, it will be observed, contains very few degrees, and of course they are large.

Plate II.—*The Path of Saturn.*

A line drawn from the points marked o, on each side of the plate, to each other, represents the apparent path of the Sun, or the ecliptick.

Saturn moves at some distance from this line, being at one time nearly two degrees and a half from it. On the 1st, he is nineteen degrees twenty-one minutes in the eighth sign, the star to the east of him being the sixth of the Balance; and his motion is direct, or from west to east, agreeably to the numbers at the bottom of the plate; and he continues this motion to the 1st of March, when he takes a turn, and moves back, though not in the same line, till the 8th of July, when he again takes a turn, and moves directly to the end of the year. By comparing together the number and size of the degrees in this plate with those in the preceding, it will be seen, that Saturn moves through a greater space than Herschell in the course of this year.

Plate III.—*The Path of Jupiter.*

As before, a line drawn from the points marked o, on each side of the plate, to each other, represent the Sun's path, or the eclipticks; and the Sun moves over this space in the twenty-seven last days of February and the four first of March. Jupiter is to the south of this line; and here the reader is requested to make an alteration for himself, or the plate will give him a false notion of Jupiter's motion. The mistake was not perceived till it was too late to rectify it. The path is marked above instead of below the line, between the points marked o on each side of the plate. It may amuse the reader to rectify this, by taking a piece of the patent paper, containing nineteen degrees, and setting off a point in the upright to the line between the points marked o on each side of the plate, and at a similar distance below the line, as the beginning of the line in the plate is from the line between the points marked o and o. This line will be continually receding from this line, downwards, to a point a little beyond XI. eighteen degrees, when it turns, and still recedes for some time, then comes nearer, as in the plate. The motion of Jupiter is direct from the 1st of January to the 8th of July, when it takes a turn, and goes back till the 3d of November. He then turns again, and moves directly to the end of the year. From this plate it is evident, that Jupiter has a much greater motion than either of the preceding planets.

Plate IV.

This plate represents the stars which were a direction to the Comet on its first appearance. Its tail pointed him out to every observer, and it was sufficient to say, that he appeared in the west soon after sun-set. The star of the first magnitude, to the west, is Arcturus; the star of the second magnitude, to the north, is the Gem, or first of the Crown. The star of the third magnitude, most to the east, is the first of Hercules. The two stars of the third magnitude, between the first of Hercules and the Gem, are the second and third of Hercules, near to which the Comet passed. To the west, and below these, the two stars of the third magnitude are the second and third of the Serpent; below which, the star of the third magnitude, is the fourth of the Serpent; under which, the star of the second magnitude, is the first; and below it, the star of the third magnitude, is the fifth, of the Serpent. The reader will mark the places where he saw the Comet in the early parts of his motion, and thus form a good idea of its progress.

Plate V.

This plate gives, upon a larger scale, the stars by which the Comet passed, when the attention of people in general had been drawn to it. The two stars of the third magnitude, to the west, are the second and third of Hercules, the second being the highest. The two other stars of the third magnitude, are the fifth and sixth; that of the fourth, below them, being the fourth of this constellation. These stars were particularly good guides for some time to the Comet's motion; and the reader will recollect, that the Comet went between the fifth and fourth, the fifth being the nearest star to the fourth, but to the west of it.

Plate VI.

This plate represents the stars by which the Comet passed, after he had passed to a considerable distance from the second and third of Hercules, which do not appear in this plate. The two stars of the third and one of the fourth magnitude, the most western in the plate, are the sixth, fifth, and fourth of Hercules; the sixth being the most western, and the fourth nearest to it. The reader recollects that the Comet went between the fourth and fifth, and travelled directly almost up to the star of the first magnitude, the first of the Harp. The three stars above the line he described, are three of the fourth magnitude, the sixteenth, the seventeenth, and the eighth of Hercules, the sixteenth being the most westerly: below the line, it first passed a star of the fifth magnitude, the tenth of Hercules; then two of the fourth, the twelfth and the fourteenth; near to which last, one of the fifth magnitude, is the thirteenth; and near them is one of the fourth magnitude, the fifteenth of Hercules. The end of the vista is the first of the Harp, and in its progress to this star it was much shorn of its beams, and was noticed only by those who were curious to observe his motions. From these plates it is evident, that our patent paper can serve us only for small portions of the hemisphere, unless we make our degrees very large; but when we have familiarized ourselves to the objects in the heavens, we may easily retrace, by the above sketches, any object that we have seen near the stars described in them.

THE END.

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